

sustainability

How the Environmental Movement Can Find Its Way Again

A three part article series illustrating an analytical approach to achieving sustainability

August 14, 2005

Executive Summary

Premise – We start with the premise that it is possible to take an analytical approach to the global environmental sustainability problem and solve it, if it is still solvable.

Synopsis – The following three articles summarize the results of taking an analytical approach to solving the problem, using a formal process derived from the Scientific Method. The analysis argues that the main reason environmental organizations are failing to achieve their objectives is that, unlike most scientists and corporations, they do not use a process tailored to the task at hand. Instead, they use an ad hoc, common sense, event oriented problem solving process. This works fine for easy problems, which are the ones the environmental movement encountered at first. But when this approach is applied to the more difficult problems that remain, it fails most of the time, because it leads to pushing on what are in reality low leverage points. *This is mainly because difficult environmental problems have characteristics that cause a large amount of solution adoption resistance. Pushing on low leverage points cannot overcome this resistance.*

However, as the sample analysis and solution in the articles show, at least one high leverage point exists that has the potential to allow solving difficult environmental problems. This includes the most urgent one of them all: climate change.

First Conclusion – Therefore our first conclusion is that environmental organizations *need to identify and address high leverage points*, or they will continue to fail to achieve their objectives.

Second Conclusion – For the difficult problems we now face it appears this can only be done by the use of a formal process tailored to the problem

type. Therefore our second conclusion is that *environmental organizations must find the right process and become process driven*, from head to toe.

Third Conclusion – Continuous incremental change is gradually improving what you have. It is the kind we are most familiar with, such as the evolutionary improvement we see in smaller computers and better medicines. By contrast, discontinuous change is throwing out what you have and replacing it with something entirely new, such as the way democracy replaced the divine right of kings, or the way a farmer moving to the city is forced to learn entirely new job skills, while most of his old ones are now obsolete.

Pursuing high leverage points through the use of a formal process will require a massive amount of discontinuous change in the environmental movement, because it means learning completely new skills and mindsets, particularly systems thinking, modeling, and adherence to a formal process. At the same time it requires unlearning the old skills and mindsets of ad hoc, common sense, event oriented problem solving. It also requires throwing away much of the strategies activists have held dear for generations, because classic activism pushes only on low leverage points. These deeply held convictions and habits may be very hard to change. Furthermore the changes must occur in a matter of years instead of generations.

For these reasons the transformation may be so difficult that many environmentalists and environmental organizations will be unable to change. *But those that can adapt will lead the world into the Age of Transition to Sustainability*, which is our third conclusion, and perhaps the most profound.

We look forward to a dialog on the potential of applying these concepts.

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And 6.5 billion other problem solvers and stakeholders

Why the Environmental Movement Needs the Right Process

In October 2004 the environmental movement awoke to the sobering truth: it had lost its way and was becoming terminally ineffective. The message was delivered in a most unexpected fashion: at the annual retreat of the Environmental Grantmakers Association. There two established environmentalists, Michael Shellenberger and Ted Nordhaus, released a long essay titled *The Death of Environmentalism*. A special series on “the alleged Death of Environmentalism” in *Grist Magazine* summarized the essay’s main thrust this way: ¹

“The paper—based on interviews with 25 leaders in the mainstream environmental movement...—argues that environmentalism is ill-equipped to face the massive global challenges of our day, particularly climate change. The movement has become a relic and a failure, the authors say, coasting on decades-old successes, bereft of new ideas, made fat and complacent by easy funding, narrowly defining ‘environmental’ problems, and relying almost exclusively on short-sighted technical solutions.

“Mainstream green organizations’ varied legislative and legal victories—and their cumulative membership rolls of some 10 million-plus—don’t cut it for [the authors of the paper]. These achievements, they claim, take place against the backdrop of a broader failure to offer the American people an expansive, inspiring, values-based vision.

“They conclude that the environmental movement should meet its maker, as it were, and give way to a more cohesive, coordinated, and ambitious progressive movement.”

What went wrong? How could a movement that was so successful in the 1970s become, as the essay called it, “just another special interest” only a few decades later?

The Death of Environmentalism did not answer this question. Nor did it even prove that it was true. But it did point out, again and again, that the environmental movement was failing to achieve its objectives. Unfortunately it was riddled with conclusions that do not follow from the facts.

The essay also did not approach the topic in an analytical fashion, but instead charged right in with a broadside of provocative assertions. Some appear true. But most do not, and so in the end, the essay served mostly to create a firestorm of disagreement and confusion, along with some honest self-examination. The latter is such a good thing and so long overdue that I suspect the net effect of the essay was beneficial.

Carl Pope, Executive Director of the Sierra Club since 1992, weighed in with a long and scathing rebuttal. He pointed out that “Their case is not only flimsy, it is internally contradictory and misleading.” I would tend to agree, though it did get a lot of people thinking.

However the real jewel in Pope’s response for me was this: “If the paper offered a clear and constructive path forward, the internal contradictions of the analysis would matter less.”

Let’s explore what may be a clear and constructive path forward.

Solving the Urban Decay Problem

The failure of the environmental movement is a classic example of an intuitively obvious and widely supported solution that, while it worked well at first on easier problems, failed spectacularly on the more difficult ones. This has happened before.

In the 1950s and 1960s, urban decay and the symptoms it caused was America's biggest problem. It would eventually reach the crisis stage with the Los Angeles race riot of 1965, which left 34 people dead. Other riots occurred in Newark and Detroit. The problem continued to deteriorate, and in 1968 Martin Luther King Jr. was assassinated, which sparked further riots, including some in the nation's capitol. The riots, high levels of crime, growing discrimination and race hatred, and a host of factors increased white flight from inner cities. Businesses also moved out. This made the urban decay problem even worse, causing a vicious cycle. Despite a plethora of attempted solutions, the problem failed to get better. By the late 1960s the problem looked hopeless.

Into this void stepped Jay Forrester in 1968. Twenty one years later, in a fascinating address to the international meeting of the System Dynamics Society in 1989, he described how he began helping to solve the urban decay problem, along with the reactions he encountered: (*italics added*)

"John F. Collins, who had been mayor of Boston for eight years, decided not to run for re-election. MIT gave him a one year appointment as a Visiting Professor of Urban Affairs, bringing him into the academic orbit to meet students, interact with faculty, and advise the administration on political issues. Collins had been a victim of polio in the epidemic of the mid 1950s and walked with two arm canes, so he needed an office in a building with automobile access to the elevator level. The building with my office was one of the few that qualified. The professor next door to me was away for a year on sabbatical leave, so John Collins ended up in the adjacent office.

"In discussions with Collins about his eight years coping with Boston urban problems I developed the same feeling that I had come to recognize in talking to corporate executives. The story sounded persuasive but it left an uneasy sense that something was wrong or incomplete. So, I suggested to Collins that we might combine our efforts, taking

his experience in cities and my background in modeling, and look for interesting insights about cities. He immediately asked how to go about it. I told him we would need advisers who knew a great deal about cities from personal experience, *not those whose knowledge came only from study and reading*. We needed people who had struggled with cities, worked in them, and knew what really happens. And furthermore, we would not know what would come of the effort, or how long it might take.

"*The process* would be to gather a group that would meet half a day a week, probably for months, to seek insights into the structure and processes of cities that could explain stagnation and unemployment. Collins listened and said, 'They'll be here on Wednesday afternoon.' Collins' position in Boston at that time was such that he could call up almost anybody in politics or business, ask for their Wednesday afternoons for a year, and get them. He delivered the people and it was out of the following discussions that Urban Dynamics developed.

"Urban Dynamics was the first of my modeling work that produced strong, emotional reactions. As you know, it suggested that all of the major urban policies that the United States was following lay somewhere between neutral and highly detrimental, from the viewpoint either of the city as an institution, or from the viewpoint of the low-income, unemployed residents. The most damaging policy was to build low-cost housing. At that time, building low-cost housing was believed to be essential to reviving the inner cities.

"The conclusions of our work were not easily accepted. I recall one full professor of social science in our fine institution at MIT coming to me and saying, '*I don't care whether you're right or wrong, the results are unacceptable.*' So much for academic objectivity! Others, probably believing the same thing, put it more cautiously as, '*It doesn't make any difference whether you're right or wrong, urban officials and the residents of the inner city will never accept those ideas.*' It turned out that those were the two groups we could count on for support if they became sufficiently involved to understand. That is a very big 'if'—if they came close enough to understand.

"*Three to five hours were required to come to an understanding of what urban dynamics was about.* Urban officials and members of the black community in the inner city would become more and more negative and more and more emotional during those three to five hours. If they were not a

captive audience, they would walk out before they understood and accepted the way in which low-cost housing was a double-edged sword for making urban conditions worse. Such housing used up space where jobs could be created, while drawing in people who needed jobs. *Constructing low-cost housing was a powerful process for creating poverty, not alleviating it.*

“My first experience with reactions to Urban Dynamics came soon after the book was published [in 1969]. We had been running a four-week urban executive's program twice a year for department-head level people from larger cities to teach various aspects of management. A group was convening shortly after Urban Dynamics came out. I was asked to take a Monday afternoon and a Wednesday morning to present the Urban Dynamics story. I have never had a lecture on any subject, any place, any time go as badly as that Monday afternoon. In the group was a man from the black community in New York who was a member of the city government. He was from Harlem, intelligent, articulate, not buying a thing I was saying, and carrying the group with him. At one point he said, ‘This is just another way to trample on the rights of the poor people and it's immoral.’ At another point he said, ‘You're not dealing with the black versus white problem, and if you're not dealing with the black versus white problem, you're not dealing with the urban problem.’ And when I said decay and poverty in Harlem in New York or Roxbury in Boston was made worse by too much low-cost housing, not too little, he looked at me and said, ‘I come from Harlem and there's certainly not too much housing in Harlem.’ That is a sample of the afternoon.

“On Tuesday evening, a dinner was held for the group. Neither Collins nor I could go; but several of our students attended. One student called me at home in the evening to report what was fairly obvious anyway—that the group was very hostile. On that bit of encouragement, I started Wednesday morning.

“An hour into Wednesday morning, the New Yorker's comments began to change character. He was no longer tearing down what was being said. *His questions began to elicit information.* Two hours into the morning, he said, ‘We can't leave the subject here at the end of this morning. We must have another session.’ I ignored the request to see what would happen next. In about twenty minutes, he repeated it. I agreed to meet them again if he could find a time and place in the program. I was

not trying to put him off; however, that usually ends such an exchange. But he went to the administration and scheduled another session.

“Later he made an appointment to come to my office to ask that I talk to a group he would invite in New York—his colleagues on his home turf. He sat in my office as relaxed as could be and said, ‘You know, it's not a race problem in New York at all, it's an economic problem,’ after telling me four days earlier that I was not even addressing the urban problem if I was not dealing with the black versus white issue. He gave me a report out of his brief case documenting the amount of empty housing in every borough of New York and the rate at which it was being abandoned. My point had been that too much housing meant that there was too much for the economy of the area to support. *He had all the proof right in his brief case. He simply had not realized what his knowledge meant until it was all put together in a new way.*

“Two years later a journalist asked me what people thought in the aftermath of Urban Dynamics. I suggested that he talk to others, and especially with the man in New York whom I had not contacted in the intervening two years. After the interview, the journalist called me to report that he had been told that *‘they don't just have a solution to the urban problem up there at MIT, they have the only solution.’* The lesson about urban behavior had stayed clear and alive for two years even back home in his native environment. The five hours of exposure to Urban Dynamics had made a lasting impression.

“But we have not solved the challenge of how to bring enough people across the barrier separating their usual, simple, static viewpoint from a more comprehensive understanding of dynamic complexity.”²

The first point of this long passage is that intuitive, common sense solutions to complex social system problems are usually *wrong*. When faced with proof that a solution they have supported is wrong, people tend to go into denial and anger. But if someone takes the time to explain why a solution is wrong, as Jay Forrester and John Collins did, people generally come around to a new realization, and can even become strong supporters of an alternative and correct solution.

It is my fond belief that this will happen to the many people who are now so strongly behind the environmental movement, as it is practiced today.

Why the Environmental Movement Has Lost Its Way

There is an easy-to-difficult environmental problem continuum, with easy problems at one end and difficult problems at the other. An easy problem has a relatively low number of sources, has clear proof of cause and effect, affects a small percentage of producers and consumers, has a small displacement in time and space, and has a relatively easy and cheap solution. A difficult problem is just the opposite. As problems move up the scale of easy-to-difficult, the present structure of the human system causes them to be harder and harder to solve, *mostly because there is more solution adoption resistance*. Let's apply this abstraction.

The first point of the long passage was that intuitive, common sense solutions to complex social system problems are usually *wrong*. The second point follows from the first: If a problem solving process tailored to the problem type is not used, then you cannot expect to solve the problem unless it is so easy that your everyday approach is sufficient.

This has been the case for environmentalism. Most environmentalists, organization managers included, use an ad hoc, common sense, *event oriented* approach to solve environmental problems. This works fine on everyday problems. It also works fine on easy environmental problems, which are the ones the environmental movement encountered at first. But when it is applied to more difficult problems, like the ones the movement encountered after the easy problems were solved, it fails most of the time. When it does succeed, it is luck that has allowed success, not problem solving ability.

An example of an easy problem was the ozone layer depletion problem. While it looked like a tremendously difficult problem at the time, it was not. It fit the pattern of easy environmental problems. It had mostly a single source: chlorofluorocarbons (CFCs) released into the atmosphere from air conditioners and refrigeration equipment. It had solid proof of cause and effect, after scientific studies were completed. The problem source involved a relatively small segment of society: the CFC manufacturing and use industry. And finally, it had a relatively easy and cheap solution: switch to a substitute.

An **event oriented** worldview is one that sees the world as the result of a long, complex succession of events. An event is a fact that happened or will happen. In this worldview, knowledge consists of a gigantic collection of haphazardly organized facts and the order they occurred or will occur in. Understanding is based on knowing what event caused or will cause another event, which in turn caused or will cause another event, and so on. The drawback is there is no underlying structure which can provide an overall pattern, only a confused jumble of causes and effects, and event chains.

By extreme contrast, **systems thinking** is striving to see the world as a node-and-relationship structure composed of interacting feedback loops. This gives a unified whole which allows the fundamental behavior patterns of the system to become plainly obvious, making the system's behavior relatively predictable.

Most difficult social problems are actually complex systems problems lying silently in wait for the naïve. Unless one is a habitual systems thinker, one's first hunch about how to solve such problems will almost certainly be wrong.

These factors made ozone depletion an easy problem, despite its apparent size and complexity. Easy environmental problems do not produce much solution adoption resistance. As a result, by the 1990s the ozone depletion problem was largely solved.

But it was the only large global problem that was. The rest, such as climate change, groundwater depletion, topsoil loss, deforestation, and abnormally high species extinction rates, remain unsolved. The reason is they do not fit the pattern of an easy problem, and so are beyond the capabilities of the conventional problem solving approach. *This is the fundamental reason why the environmental movement has lost its way. It lacks the proper problem solving process.*

Environmentalism Is Not Yet Environmentalism

Environmentalism could find its way again, if it looked over its shoulder at another group of problem solvers who finally did find their way.

Their turning point occurred in the early 17th century. They were a small band of dedicated problem solvers who, once they had found their way, went on to bring more benefits to mankind than any other group in history. The string of benefits includes the amazing life spans we see today, the quantum leap in agricultural production efficiency, and the innumerable creature comforts that technology has brought, such as the way you can fill your living room with the perfect sound of the Vienna Philharmonic, and if you wish, an image of the story of Tolkien's Lord of the Rings so real the mind is transported into a different reality. This string of new benefits shows little sign of stopping any time soon, because this band of problem solvers has found the ultimate tool.

These are the scientists. Their tool is the Scientific Method.

If environmentalists and environmental organizations are serious about solving difficult environmental problems, they will sooner or later be forced to make the same discovery that scientists made centuries ago. Science discovered that unless it used a problem solving process tailored to the problem type, it was doomed to eternal failure, punctuated by a small number of seemingly random successes. We now know these were lucky guesses. Science did not become science until it adopted the Scientific Method, perfected by Sir Francis Bacon and René Descartes in the early 17th century after almost 2,000 years of effort.

Environmentalism will not become environmentalism until it adopts a similar and suitable method.

Identification of the global environmental sustainability problem is now more than a generation and a half old. If the problem solving process presently used is good enough to solve the problem, it would have been solved by now. If the present approach is continued, then problem solvers are essen-

tially doing the same thing scientists did before they adopted the Scientific Method: relying on trial and error. If a problem has a small number of solutions to try, and there is plenty of time, and erroneous solutions do not make the problem worse or insolvable, then trial and error can work. This is not the case with the difficult problems the environmental movement now faces.

After a thousand years of the Dark Ages, Europe returned to the Age of Reason in the second half of the 17th century, *principally because of the effects of the Scientific Method and similar rational problem solving methods derived from it.* Also known as The Enlightenment, The Age of Reason emphasized the use of reason over dogma and evidence over time honored assumptions that were too often false. According to wikipedia.com, *"The movement's leaders viewed themselves as a courageous, elite body*

of intellectuals who were leading the world toward progress, out of a long period of irrationality, superstition, and tyranny which began during a historical period they called the Dark Ages."

It could happen again.

The Scientific Method

1. Observe a phenomenon that has no good explanation.
2. Formulate a hypothesis.
3. Design an experiment to test the hypothesis.
4. Perform the experiment.
5. Accept, reject, or modify the hypothesis.

The Three Dark Ages

The first Dark Age ended when Aristotle (582 to 496 BC) invented logic. People could now correctly reason out why their world behaved the way it did. The first Age of Reason began, and Western civilization began to flourish, starting in ancient Greece.

The second Dark Age began around the time of the fall of the Roman Empire, as barbarians periodically swept over Asia and Europe, obliterating any hope of intellectual stability and progress. The church filled the void, but even there, the Age of Reason had been snuffed out and replaced with dogma. This ended in the second half of the 17th century when the Scientific Method was perfected.

Now, most unexpectedly, civilization has slipped into a third Dark Age. It has become mired in mass self-destruction via environmentally unsustainable practices on a massive, global scale. *Environmentalists will only be able to help civilization end the third Dark Age and return to the Age of Reason if they adopt a suitable problem solving process.*


The System Improvement Process

Let's take a look at a problem solving process that could serve as a suitable starting point. This is the System Improvement Process. It is a simple, generic, highly analytical process designed to apply to all complex social system problems. It has four main steps. The first step defines the overall problem. The process then decomposes the overall problem into three subproblems, and uses steps 2, 3, and 4 to solve each of them. Here is an outline of the process:


- 1. Problem Definition** – What is the problem?
- 2. System Understanding** – Why are the three subproblems occurring?
 - 2.1 Why is there such strong resistance to adopting the solution?
 - 2.2 Why is the system not naturally in the goal state?
 - 2.3 Why is the system not staying in the goal state?
- 3. Solution Convergence** – How can the three subproblems be solved?
 - 3.1 How can adoption resistance to the solution be overcome?
 - 3.2 How can we move the system to the goal state?
 - 3.3 How can we keep the system in the goal state?
- 4. Implementation** – Once a solution is found, this uses three sequential substeps to solve the three subproblems:
 - 4.1 Overcome resistance to solution adoption.
 - 4.2 Move from the present state to the goal state.
 - 4.3 Stay in the goal state indefinitely.

Use of a process like this changes everything. It allows problem solvers to more easily pick up an engineer's hat, put it on, and proceed in an analytical fashion, one much more likely to solve the global environmental sustainability problem in time.

The four main steps are:


 **Step 1. Problem Definition** – First the problem to solve is formally defined, in terms of the symptoms to be alleviated. This gives a clear, unambiguous definition of exactly what system behavior must change to consider the problem solved. The


result is all problem solvers are now working on the same problem, with a minimum of effort. All work is now very focused.

 **Step 2. System Understanding** – Next the system is examined, with a single guiding question: *Why are the three subproblems occurring?* This question decomposes one large problem into three smaller, distinctly different problems, each of which is much easier to solve. For a difficult complex system problem, this has the effect of taking a giant Gordian knot of incomprehensible complexity and deftly turning it into three much simpler and therefore potentially solvable problems. *In practice this decomposition is so powerful it can transform a problem from insolvable to solvable.*

Unless the guiding question is answered deeply and correctly for all three subproblems, any solution selected cannot be anything more than an educated guess. The solution also cannot get to the root of the problem. These of course are the prime reasons why past solutions have failed—they were no more than intuitive hunches combined with political expediency, and failed to get to the fundamental causes of the problem.

The output of this step is a comprehensive model of understanding based on systems thinking, the core of which is a computer simulation model of the system and how it behaves. Note this is precisely what Jay Forrester had to do to solve the urban decay problem.

 **Step 3. Solution Convergence** – Only after a high level of system understanding is reached does the Solution Convergence step begin. If the previous step has been done well, then this step is almost trivial. This is because system behavior is now predictable. It is now so predictable that solution search can very quickly converge on the solution with the preferred outcome. Once that happens the problem is “solved.” The key output of this step is a collection of solution elements and an Implementation Plan.

 **Step 4. Implementation** – The Implementation Plan is carried out. It uses three sequential and slightly overlapping phases to solve the three subproblems.

In the first phase, resistance to adopting the solution is overcome. Adoption resistance is related to the phenomenon of *change resistance*, which is very common in complex social system problems. While

resistance to new methods of solving a problem are sometimes part of change resistance, such as the need to adopt the use of formal process and systems thinking, the main resistance is usually to the aspects of the solution that will force agents to change their behavior. For example, many corporations appear to be strongly resisting becoming sustainable because they perceive it will reduce sales and short term profits.

In social systems, solution adoption resistance is usually the crux of the problem. For example, in the global environmental sustainability problem, civilization knows by now what must be done: live sustainably. But it doesn't want to take the next step and actually do it, for an intricate variety of reasons. Those reasons cause "change resistance," which is the *social side* of the problem. This is what the first phase of the Implementation Plan overcomes. The second and third phases are much easier, and are explained elsewhere.

There are three keys to the success of the System Improvement Process. One is decomposition into the three subproblems. The second is the presence of the System Understanding step. It is usually almost totally absent from popular problem solving approaches. Yet this is where problem solvers should spend about 80% of their time. The third and most important is the process addresses the *social side* of the problem. This theme will be taken up later in this article series.

The Importance of Modeling

The third point of the long passage above is the importance of modeling. Jay Forrester would have been totally unable to help solve the urban decay problem without the tool of simulation modeling. It lay at the heart of his process.

All conscious decisions are based on mental models. However the mind has its limitations. If a problem is too big to be adequately represented by a mental model, then its solution requires a tool that can handle a bigger model than the mind can. For complex social systems, the only known tool that can do this well is the one Jay Forrester invented: computer simulation modeling.

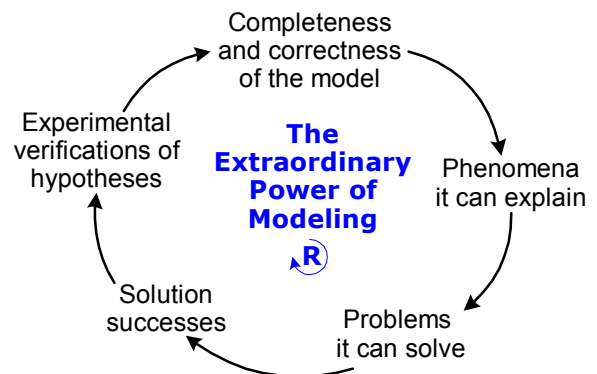
A formal model can not only handle a larger model than the mind can. It can also handle it *correctly*. This is because the human mind is notoriously unable to handle what have become known as *feedback loops*. A feedback loop exists when a

change in one node of a system results in changes elsewhere that ultimately come back to affect the node still more.

The special series on "the alleged Death of Environmentalism" in Grist Magazine also had this to say: (*italics added*)

"Of all the points made by [the Death of Environmentalism essay], perhaps the most telling is in a follow-up post on the Breakthrough Institute blog: 'Nearly every profession, from public health to business to law, has research studies, conferences, and peer-review journals dedicated to *evaluating what's working and what's not*. ... *The environmental community has nothing like this.*'"

"Evaluating what's working and what's not" is the use of a formal process that employs a critical feedback loop. This loop improves one's mental and/or physical models of the world. Every time an experiment or solution attempt ³ is tried, the results can be evaluated to see if the hypotheses of the proposed solution was confirmed or denied. Such a loop would look about like the one shown below, which illustrates **The Extraordinary Power of Modeling**.



Let's walk through this reinforcing feedback loop starting at the top. The loop is first created when a mental or physical model begins to be constructed. This increases the *Completeness and correctness of the model*. This in turn increases the number of *Phenomena it can explain*, which also increases the number of *Problems it can solve*. This quite naturally increases the number of *Solution successes*. If each success is examined to see what can be learned from it from the viewpoint of the Scientific Method, then this increases *Experimental verification of hypotheses*. Each hypothesis is a rule of cause and effect. Simplifying, a rule is a model node, so this in turn increases the *Completeness and correctness of the model*, and the loop starts all over

again. It grows and grows, because it is self-reinforcing.

Those familiar with the Scientific Method may have noticed that the loop is also an expression of that. The “model” in the loop is the body of scientific knowledge built up over a period of time. Knowledge is the same as a model of understanding of the world. Thus the loop could also be named **The Extraordinary Power of the Scientific Method**.

The environmental movement has no such loop, as the above quote from Grist Magazine pointed out. The loop is not at all difficult to build, as so many other fields have shown. *Until such a loop is built, environmentalism is not yet environmentalism, nor is it science.*

The Folly of Pushing on Low Leverage Points

The better the model, the better the understanding of a complex social system. Such systems are so chock full of feedback loops that unless they are modeled, their behavior will remain a mystery. The unaided mind will be unable to understand any but the simplest cases.

This is because hidden feedback loops cause social systems to behave counter intuitively. You expect them to behave one way, but upon trying a solution based on that assumption, they behave in a different, often highly unexpected way. This leads to the trap of pushing on low leverage points to solve a problem, such as happened in the urban decay problem. This is the trap the environmental movement has fallen into, which is explained in part two of this article series.

Why do people use low leverage points again and again? The founder of the field of system dynamics, Jay Forrester, has this to say: (*italics added*)

“Social systems are inherently insensitive to most policy changes that people select in an effort to alter behavior. In fact, a *social system draws attention to the very points at which an attempt to intervene will fail*. Human experience, which has been developed from contact with simple systems, leads us to look close to the symptoms of trouble for a cause. But when we look, we are misled because the social system presents us with an apparent cause that is plausible according to the lessons we have learned from simple systems, although

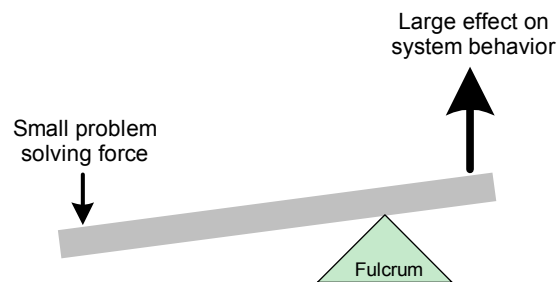
*this apparent cause is usually a coincident occurrence that, like the trouble symptom itself, is being produced by the feedback loop dynamics of a larger system.”*⁴

As we are attempting to demonstrate in these articles, diligent use of the right process can quickly lead to a correct, comprehensive model of understanding. Such a model will offer so many insights that the best solution will nearly fly off the page. This is because a good model shows precisely where the key low, medium, and high leverage points are located.

Thus once problem solvers adopt and master the right process, a whole new alternative to the folly of pushing on low leverage points almost magically appears: push on the high leverage points instead!

What exactly is leverage? What do we mean when we say we must push on high leverage points to have the highest probability of solving complex social system problems, given the low amount of force that most social problem solvers tend to have, such as environmentalists?

Leverage is the ratio of change in input to change in output. A *high leverage point* is a place in the system where a small amount of force (the effort to prepare and make a change) causes a large amount of predictable response. At a favorable high leverage point a small structural change to a system can cause the system to behave much more favorably. *Only the use of the correct high leverage points can solve a difficult complex social system problem.*



As conceptually illustrated in the diagram above, the choice of the correct high leverage point allows a small problem solving force to have a large effect on system behavior. This requires choosing the right lever and its application point. In a complex social system, leverage is the use of indirect force, rather than direct force.

For example, consider the very simple *event chain* of A causes B and B causes C, where C is the problem symptom. Pushing at B is direct force, but pushing at A is indirect. In this case, if there are no further causes of A, B, or C, then A is the root cause. This is the most common way people see their world—as one that consists of events, event chains, and root causes. This is *event oriented thinking*.

Let's examine a second case using a *systems thinking* viewpoint: Suppose A causes B, B causes C, C causes D, and D causes A. This is a feedback loop. Because we have gone deeper and are now correctly seeing dynamic systems as composed of many feedback loops, we can no longer go to the end of an event chain and blithely declare that to be the root cause. Instead, the so called root cause is the structure of the system. *Structure* is the shape of a system's key feedback loops.

Simple problems are simple enough to be solved by event oriented thinking. They are easy to solve because they yield to *root cause analysis*, which means following one or more event chains all the way to its end, where the root cause lies. On the other hand, difficult social system problems are almost invariably the result of hidden, illusive, totally counter intuitive feedback loops. This makes them nearly impossible to solve using root cause analysis, because feedback loops have no end.

Therefore, in order to solve the difficult problems we now face, environmentalists must abandon thinking in terms of events and simplistic root causes, and switch to thinking in a wholly new way: *the behavior of a system is an emergent property of its structure*.

Summary and Conclusions

The environmental movement has indeed lost its way, as results have shown. And, as *The Death of Environmentalism* pointed out, it has no credible plan for finding its way.

This has happened before. The failure of the environmental movement has a historic parallel: the US urban decay problem. There problem solvers also tried intuitively obvious solutions for so long that the system threatened to soon turn into mass self-destruction.

The urban decay problem was solved by the application of simulation modeling. As that model showed, the four leading solutions turned out to range from outcome neutral to highly detrimental. None were actually helping to solve the problem.

But as the model also showed, there was a surprisingly simple workable solution that had not been seriously tried. The lesson here is environmentalists must model to avoid the same trap.

The environmental movement has lost its way because it is now where science was before scientists adopted the Scientific Method as their central problem solving process. *Environmentalism will not become a true science until it adopts a similar and suitable method*. Only after it has found the right process can the environmental movement lead humanity out of the third Dark Age and back into the Age of Reason.

This can be done only by the rigorous use of a formal problem solving process that fits the problem type. An example of such a process is the System Improvement Process. Most importantly, it addresses the *social side* of the problem.

This process employs the powerful tools of systems thinking and simulation modeling. Skillful application of these tools will lead problem solvers away from the low leverage points they are currently pushing on to high leverage points. *Only the use of the correct high leverage points can solve a difficult complex social system problem*.

This is not to say that every environmentalist needs to become a process and modeling expert. But it does mean that every environmental organization should be driven by a suitable process and have sufficient systems thinking and modeling skills at its disposal, unless it is one of the few that is working on problems so easy they do not require these tools.

Process driven problem solving and model centric reasoning are highly analytical techniques. They require high amounts of training and skill to do well. Probably more than 90% of the population has never been exposed to either of these skills. Thus the environmental movement has a sea change ahead. It is the same change that took science centuries to go through, and takes the average profession many decades. This has grave implications.

Such a transformation is so pervasive and deep, and runs so against conventional wisdom, that it qualifies as a paradigm change. Furthermore, the clock is ticking. The projections in the third edition of *Limits to Growth* in 2004 show that *Homo sapiens* has, at most, only a few decades left in which to change course.

Can environmentalists and environmental organizations go through this critical transformation overnight?

No one knows the answer to that question yet.

Why Environmentalists Are Facing Such Hostile Opposition

Part one of this article series concluded that the fundamental reason the environmental movement has failed to achieve its objective is that it lacks a suitable problem solving process. A suitable one, the System Improvement Process, was presented. Let's show how it can be applied.

Step one of the process, problem definition, occurred in 1972 when *Limits to Growth* roughly defined the global environmental sustainability problem. That book, the Stockholm conference of 1972, and other events brought the sustainability problem to the world's attention. Since then many dedicated problem solvers have worked on the problem. While there have been some small successes, such as the stratospheric ozone depletion problem, the overall problem has grown steadily worse. No comprehensive credible solution is in sight. As the third edition of *Limits to Growth* lamented in 2004, "humanity has largely squandered the past 30 years."

Step two of the process involves understanding why the system with the problem behaves the way it does. This requires first understanding why there is such strong resistance to adopting the solution, which is the theme of this article.

Since the ascendancy of the George W. Bush administration in the United States in 2000, opposition to almost all environmental initiatives has grown to the point that problem solvers have been forced to fall back from trying to solve the problem to just trying to preserve what little progress they have made. By and large, they are failing. ⁵

Why is such strong opposition occurring? Why is there such a "harsh political climate," as the Natural Resources Defense Council puts it? Why do we face "the most hostile environment in which we have ever struggled to advance our goals," as the Union of Concerned Scientists describes it? ⁶

If we could understand in detail why political decision making works the way it does, then we could go further than we've ever gone before. *We could find the high leverage points of the system that would allow changing that harsh political climate into one that actively welcomed solving the problem.*

Let's explore this possibility.

The Dueling Loops of the Political Powerplace

We begin by using the same tool that *Limits to Growth* used: modeling. Only this time, instead of modeling the *technical side* of the problem (economics, technology, the environment, and demographics), let's model the *social side* of the problem (human decision making).

This is important, because society knows what it must do to survive: live sustainably. There are countless practical ways we could do that, which is the technical side of the problem. But for strange and mysterious reasons most of society is strongly resisting doing them. This is change resistance, which is the social side of the problem. *Thus the social side of the problem is the crux.*

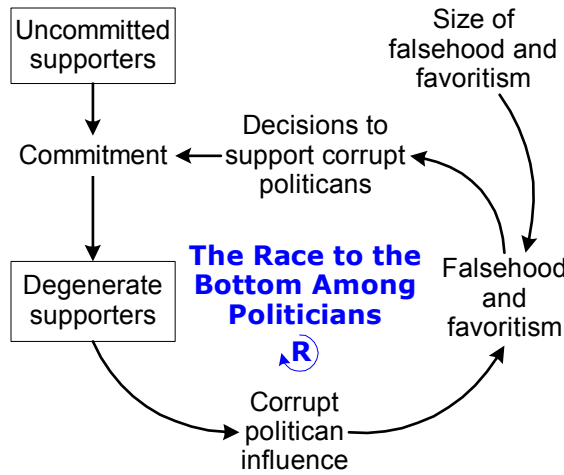
There are two feedback loops in the human system that, in the large, affect citizen's lives more than anything else. They are the loops that politicians use to gain supporters.

Over time, social evolution has pared the many strategies available for gaining political support into just two main types: the use of truth (virtue) and the use of falsehood and favoritism (corruption). For example, a virtuous politician may gain supporters by stating, "I know we can't balance the budget any time soon, but I will form a panel of experts to determine what the best we can do is." Meanwhile, a corrupt politician is garnering supporters by saying, "Economics is easy. You just put a firm hand on the tiller and go where you want to go. I can balance the budget in four years, despite what the experts are saying. They are just pundits. Don't listen to them. A vote for me is a vote for a better future." The corrupt politician is also saying, to numerous special interest groups, "Yes, I can do that for you. No problem." Guess who will usually win?

The use of corruption to gain supporters is the dominant loop in politics today. Corruption consists of falsehood and favoritism. Most politicians use rhetoric, half truths, glittering generalities, the sin of omission, biased framing, and many other types of falsehood to make themselves look as appealing as possible to the greatest number of people possible.

Particularly when an election is drawing near, most politicians use the *ad hominem* (Latin for against the man) fallacy to attack and demonize their opponents. For example, the use of the Swift boat ads in the 2004 US presidential campaign to attack John Kerry's character were an *ad hominem* fallacy, because they had nothing to do with Kerry's political reasoning or positions. Other terms for the *ad hominem* fallacy are demagoguery, shooting the messenger, negative campaigning, smear tactics, and sliming your opponent. Finally, once in office nearly all politicians engage in acts of favoritism, also known as patronage.

Politicians are forced to use corruption to gain supporters, because if they do not they will lose out to those who do. This causes a **Race to the Bottom Among Politicians** to appear, as shown.



To understand how this loop works, let's start at the bottom. *Corrupt politician influence* is used to broadcast as much *Falsehood* as possible to potential supporters. It is also used to promise and give out as much *Favoritism* as possible. All this is done with speeches, interviews, articles, books, jobs, lucrative contracts, special considerations in legislation, etc. The falsehood and favoritism is a cunning blend of whatever it takes to gain supporters. The end justifies the means. Note that the more influence a politician has, the greater the amount of favoritism they can plausibly promise and deliver.

The greater the falsehood and favoritism, the more people who will make *Decisions to support corrupt politicians*. This causes *Commitment* to occur, which moves people from the pool of *Uncommitted supporters* to *Degenerate supporters*. This in turn increases *Corrupt politician influence* even more, and the loop starts all over again. As it goes around and around, each node increases in quantity, often to astonishing levels. The loop stops growing when most supporters are committed, though in extreme cases it continues growing anyhow.

This is the loop that is driving politics to extremes of falsehood and favoritism in far too many areas of the world. This loop is the structural cause behind most of the corruption and bad decisions in government today.

The race to the bottom employs a dazzling array of deception types. These are usually combined, which increases their power. Here are some of the main types:

False promise – A false promise is a promise that is made but never delivered, or never delivered fully. False promises are widely used to win the support of segments of the population, such as organized special interest groups, industries, and demographic groups like seniors or immigrants. False promises flow like wine during election season.

False enemy – Creating a false enemy works because it evokes the instinctual fight or flight syndrome. The brain simply cannot resist becoming aroused when confronted with a possible enemy.

The two main types of false enemies are *false internal opponents*, such as negative campaigning, the Salem witch trials, and McCarthyism, and *false external opponents*, such as communism and the second Iraq “war.” While communism and Iraq were true problems, both were trumped up enormously to serve the role of a false enemy. False enemies are also known as scapegoats. They can also be used to divert the public’s attention from more important issues. Name-calling is one technique used to create a false enemy, but the biggest is fallacious arguments, better known as lies.

Pushing the fear hot button

– When a politician talks about almost everything in terms of terrorism, or communism, or crime, or threats to the quality of medical care, and so on, that politician is pushing the fear hot button. It is very easy to push. Just use a few of the right trigger words, throw in a dash of plausibility, and the subconsciousness is automatically hoodwinked into a state of fear, or at least into wondering if there is something out there to fear. Whether or not an enemy actually is out there doesn’t matter—what matters is that we think there *might* be one.

Fear clouds the judgment, making it all the harder to discern whether there really is an enemy out there. Because we cannot be sure, we play it safe and assume there is at least some risk. Since people are risk averse, the ploy works and we become believers. We have been influenced by statements of what *might* be lurking out there. Our fear hot button has been pushed and it worked.

Wrong priority – Wrong priorities stem from hidden agendas. A *hidden agenda* is a goal a politician wants to achieve but does not want his supporters to know about, because he knows they will not like it.

There are many ways a hidden agenda can come about. A politician may support a certain ideology, and so bends everything to support the goals of that

ideology. Or maybe he has accepted donations and/or voter support from special interests, such as corporations, and so must promote their agenda. Or maybe he had to cut a deal by agreeing to a position he doesn’t like in order to get other politicians to support his own position. And so forth.

A politician with a hidden agenda must make the wrong priorities seem like the right ones in order to achieve what’s on the hidden agenda. How can he do this? For a corrupt politician such matters are child’s play—manipulate the public through more false promises, create a false enemy, push the fear hot button hard and often, repeat the same lie over and over until it becomes “the truth,” and so forth.

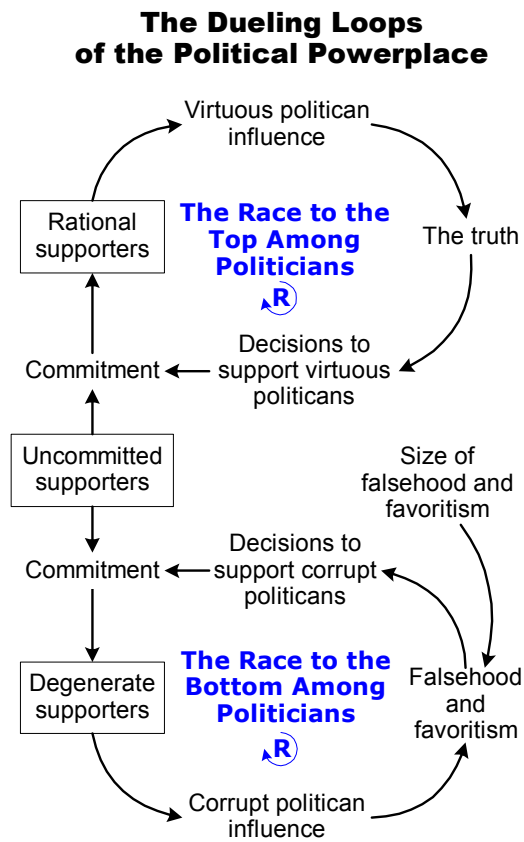
The low priority that environmental sustainability receives from most governments today is rapidly becoming *the* textbook example of how devastating the results of the wrong priorities can be.

Opposing the race to the bottom is the race to the top. The two loops are joined together as shown. Because each loop competes for the same *Uncommitted supporters*, they are “dueling loops.”

In the race to the top virtuous politicians compete for supporters on the basis of *The truth*. No favoritism is used, because those who tell the truth treat everyone equitably. Virtuous politicians can help improve things so that society benefits as a whole, but they cannot promise or give anyone more than their fair share.

The race to the top works the same as the race to the bottom. The crucial difference is that in the race to the top, the size of the truth cannot be inflated. Virtuous politicians cannot promise more than they can honestly expect to deliver. Nor can they use favoritism to inflate expectations of how well they can help their supporters.

Thus the race to the bottom has an inherent structural advantage over the race to the top. This is the key to understanding how to solve the problem. A corrupt politician will promise more, evoke



false enemies more, push the fear hot bottom more, pursue wrong priorities more, and use more favoritism than a virtuous politician can. The result is the race to the bottom is normally the dominant loop.

The two loops are locked in a perpetual duel for the same supporters. In addition, each politician has his or her own loop, and battles against other politicians for the same supporters. It is these many loops and the basic dueling loops structure that forms the basic structure of the political powerplace.

The dueling loops structure offers a clear and extremely useful explanation of why we are facing such a harsh and hostile political climate. This strong opposition occurs because a dominant race to the bottom causes corrupt politicians to work mostly for the selfish good of degenerate supporters, instead of working for the common good of the people. In other words:

The Race to the Bottom Is Easily Exploited by Special Interests

Exploitation is the use of others to increase your own competitive advantage, at the cost of theirs. Because this so obviously self-destructive to those being exploited, deception is required to pull it off.

The race to the bottom provides the perfect mechanism for political exploitation. Each politician has his or her own loop. There is also a hierarchy of loops, since a politician's supporters can be other politicians. At the top of the hierarchy is the top politician, such as a president, political strategist, or party. Whoever is at the top has tremendous leverage. *Thus the dueling loops structure greatly amplifies the power of the exploiter.*

A corrupt politician, by accepting donations (legal bribes) and votes in return for favoritism, becomes beholden to the special interest groups involved. If a special interest group is powerful enough, it can control a majority of the key politicians in a system, and thus the system.

Exploitation frequently occurs when a special interest group has interests that conflict with those of society as a whole. Common examples are religious fundamentalists, the rich, the military, and large corporations. The latter two make up the infamous military industrial complex.

If a special interest is powerful enough, it can control and exploit a political system by clever use of the race to the bottom. This is exactly what is hap-

“A lie can travel halfway around the world while the truth is putting on its shoes.”— Mark Twain.

“A lie repeated often enough becomes the truth.”
— Vladimir Lenin.

“It does not matter how many lies we tell, because once we have won, no one will be able to do anything about it.” — Statement by Dr. Joseph Goebbels to Adolf Hitler, early 1930s, from *The Rise and Fall of the Third Reich*, by William L. Shirer.

pening today. The global political system is by and large being exploited by:

The New Dominant Life Form

Let's define a *life form* as any independent agent that follows the three fundamental requirements of evolution. These requirements are replication, mutation, and survival of the fittest.

Here's a question: What life form has the ability to replicate instantly with almost no expenditure of energy, can mutate during replication or at any time thereafter, and, when it has failed in the battle of survival of the fittest, sells little pieces of itself to its competitors in order to minimize its own pain of death? These are fantastic powers no human could hope to have. But what if we go further, and ask what life form has the miraculous power of being in many places at the same time, has an infinite life span, and can cleave off chunks of itself and have them instantly come alive? That would make it a formidable competitor indeed, one that could run rings around any other plant or animal. Darwin would be astounded.

But there's more. What life form totally dominates mankind, by controlling most jobs in developed countries, by determining the path of nearly all of new technology, products, and services, by controlling elections and political decisions more than any other life form, and by defining the very evolution of culture to its advantage through demand advertising, ownership of the media, and new product design? If that is not enough, what life form controls the billions of boxes in our homes that provide us with most of our “news,” and most of our new knowledge once we have finished school, while at the same time subconsciously indoctrinating us to be high volume, complacent consumers? To top it

off, what life form is spreading exponentially from industrialized countries to the rest of the world, and will soon dominate them all? The answer is obvious. It is the modern corporation, which is the New Dominant Life Form.

Thus the dominant life form on Earth is no longer Homo sapiens. Instead, it is the modern corporation and its allies.

This is the real enemy environmentalists are battling. The Bush administration, as well as with others before it and around the world who oppose sustainability, are mere proxies for the real opponent: the modern corporation and its allies. Its allies include many of the rich, the military, politicians, and special interest groups, such as the religious right.

Please note this is not an indictment of all corporations and their managers. Most are doing the best they can, and are basically good. Each agent, from their perspective, is behaving rationally. *It is the life form as a whole that has the emergent property of behaving unsustainably.*

The goal of an agent determines its behavior. The goal of most corporations is to maximize the net present value of profits. The goal of most individuals, once they have gotten past the survival and security stage, is to maximize quality of life for themselves and their descendants.

These goals are mutually exclusive. As a result, as things get better for the New Dominant Life Form they get worse for the previously dominant life form: *Homo sapiens*. For example, as Gross World Prod-

The World's 100 Largest Economies

Corporate revenues versus country GDP for 2000 in millions of US\$

1	United States	\$9,882,842	51	Iran	\$98,991
2	Japan	\$4,677,099	52	Egypt	\$98,333
3	Germany	\$1,870,136	53	Ireland	\$94,388
4	United Kingdom	\$1,413,432	54	Axa	\$92,781
5	France	\$1,286,252	55	Singapore	\$92,252
6	China	\$1,079,954	56	Sumitomo	\$98,168
7	Italy	\$1,068,516	57	Malaysia	\$89,321
8	Canada	\$689,550	58	IBM	\$88,396
9	Brazil	\$587,553	59	Marubini	\$85,351
10	Mexico	\$574,512	60	Colombia	\$82,849
11	Spain	\$55,004	61	Volkswagen	\$78,851
12	India	\$479,404	62	Hitachi	\$76,126
13	South Korea	\$457,219	63	Philippines	\$75,186
14	Australia	\$394,023	64	Siemens	\$74,858
15	Netherlands	\$364,948	65	ING Group	\$71,195
16	Argentina	\$285,473	66	Allianz	\$71,022
17	Russian Federation	\$251,092	67	Chile	\$70,710
18	Switzerland	\$240,323	68	Matsushita	\$69,475
19	Belgium	\$231,016	69	E.ON Energy	\$68,432
20	Sweden	\$227,369	70	Nippon Life Insurance	\$68,054
21	ExxonMobil	\$210,392	71	Deutsche Bank	\$67,133
22	Turkey	\$199,902	72	Sony	\$66,158
23	Wal-Mart	\$193,295	73	AT&T	\$65,981
24	Austria	\$190,957	74	Verizon	\$64,707
25	General Motors	\$184,632	75	U. S. Postal Service	\$64,540
26	Ford	\$180,598	76	Philip Morris	\$63,276
27	Hong Kong	\$163,261	77	Pakistan	\$61,673
28	Denmark	\$160,780	78	CGNU	\$61,498
29	Poland	\$158,839	79	J. P. Morgan & Chase	\$60,065
30	Indonesia	\$153,255	80	Carrefour	\$59,887
31	DaimlerChrysler	\$150,069	81	Credit Suisse	\$59,315
32	Norway	\$149,349	82	Nissho Iwai	\$58,557
33	Royal Dutch/Shell	\$149,156	83	Honda	\$58,461
34	BP	\$148,062	84	Bank of America	\$57,747
35	General Electric	\$129,853	85	BNP Paribas	\$57,611
36	Mitsubishi	\$126,579	86	Nissan	\$5,077
37	South Africa	\$125,887	87	Peru	\$53,882
38	Thailand	\$121,927	88	Toshiba	\$53,826
39	Toyota	\$121,416	89	Algeria	\$53,817
40	Venezuela	\$120,484	90	PDVSA	\$53,680
41	Finland	\$119,823	91	Assicuraz. Generali	\$53,333
42	Mitsui	\$118,013	92	Fiat	\$53,190
43	Greece	\$111,955	93	Mizuho	\$52,068
44	CitiGroup	\$111,826	94	SBC Communications	\$51,476
45	Israel	\$110,332	95	Boeing	\$51,321
46	Itochu	\$109,765	96	Texaco	\$51,130
47	Total FINA Elf	\$105,869	97	New Zealand	\$49,943
48	Portugal	\$103,871	98	Fujitsu	\$49,603
49	NTT	\$103,234	99	Czech Republic	\$49,510
50	Enron	\$100,789	100	Duke Energy	\$49,318

In terms of corporate revenues versus national gross domestic product (GDP), of the 100 largest economies in the world in the year 2000, 53 were corporations. Of the 190 countries in the world, ExxonMobil, the largest corporation on the planet, is larger than 170 of them. ⁷

uct continues to rise, sales and profits soar to unprecedented heights. However, so does pollution and natural resource depletion. While these effects are delayed, it is only a matter of time before the quality of life for *Homo sapiens* begins to fall.

Why Conventional Wisdom Fails

Given this model of behavior, why does the conventional approach to solving the environmental sustainability problem fail?

The standard solution is to employ the race to the top to spread as much truth as possible about the problem. This is intended to gain enough support to solve the problem.

“The truth” is spread by lobbying, articles, environmental magazines, interviews, demonstration projects, scientific reports, and so on. By now there is overwhelming evidence that mankind must change course soon, so this approach has tremendous appeal.

However, this approach only works on those who can see the real truth and are not already committed to supporting corrupt politicians and their ideologies. Therefore which of the two dueling loops is dominant depends on who can spread the most truth versus who can spread the most falsehood and favoritism. Because falsehood and favoritism allows corrupt politicians to inflate the value of what they can offer their supporters, corrupt politicians have an inherent advantage. The race to the top could only dominate if its special interest groups were much more powerful than those associated with the race to the bottom. However, this is not the case. Corporations are typically able to outspend environmentalists by one or two orders of magnitude. Thus corrupt politicians have a second advantage:

the ability to spend much larger amounts of money on deception. When these two advantages are combined, they become unbeatable.

Therefore pushing on “more of the truth” is a low leverage point. There is very little gain for a large amount of effort. *Environmentalists simply do not have the force (wealth, numbers, and influence) necessary to make pushing on this point a viable solution.*

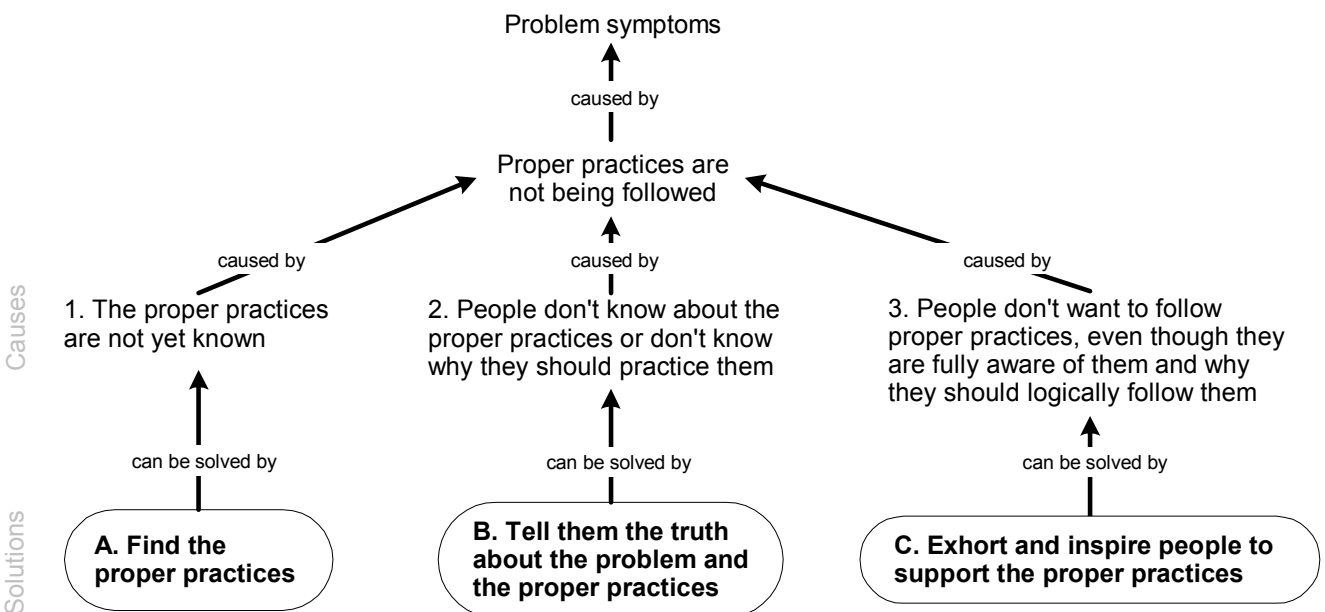
Why Classic Activism Fails

Another way to explain why conventional wisdom fails is to examine the main problem solving approach of environmentalism, classic activism, and see why that is failing to solve the problem. This analysis leads to the same conclusion: “more of the truth” doesn’t work.

Classic activism is used by citizen groups, particularly progressives, to solve problems that governments are not addressing. Examples are discrimination, women’s suffrage, the dangers of smoking tobacco, and the plight of the poor. If it is extremely successful, then governments assume solution responsibility. The basic high level process is shown below.

The process starts with discovery of the *Problem symptoms*. These are caused by *Proper practices are not being followed*. For example, the symptoms of environmental degradation are caused by too many people not following the proper practices that

The Basic Process of Classic Activism



would make their behavior sustainable. *Proper practices are not being followed* has three causes:

Cause 1 – If the problem is new, problem solvers must start with the first cause: *1. The proper practices are not yet known.* This can be solved by *A. Find the proper practices.* For example, renewable energy sources can be developed, tested, and proven to be effective.

Cause 2 – Once the proper practices are found, activists move on to the second cause, which is: *2. People don't know about the proper practices or don't know why they should follow them.* This is to be expected if the proper practices are new. This can sometimes be solved by *B. Tell them the truth about the problem and the proper practices.* As explained above, “the truth” can be spread by lobbying, articles, environmental magazines, interviews, demonstration projects, scientific reports, and so on. For easy problems, solutions A and B are enough.

Cause 3 – But in more difficult problems there is a third cause: *3. People don't want to follow the proper practices, even though they are fully aware of them and why they should logically follow them.* Here the standard activist strategy is to *C. Exhort and inspire people to support the proper practices.* This is attempted with eloquent writing, passionate speeches, pleadings with decision makers, demonstrations, marches, confrontational stunts to shock the public into coming to its senses, and so on. This can work for some medium difficulty problems. However, for certain types of difficult problems, solution C does not work.

Most what-to-do environmental literature falls into the three main branches of this process. For example, *Silent Spring* was a superb mixture of solutions B and C, with a little bit of A. *Natural Capitalism*, a book about how corporations can take the lead and create the “next industrial revolution” by switching to more environmentally sustainable technology, uses mostly A and B. Al Gore's *Earth in the Balance* is mostly B. Environmental and nature magazines, such as *Sierra*, *National Wildlife*, and *Audubon*, are B and C. B is also known as education on the facts or “appeal to logic.” C is the “appeal to emotion” side of the facts, also known as rhetoric.

Most environmental organizations also rely exclusively on A, B, or C to achieve their goals. Lawsuits to comply with existing environmental regulations would seem to fall outside of A, B, or C.

However, this is enforcement of the legal truth by telling judges about the truth of the facts involved. It is thus a form of B. Lobbying is mostly B, with a dash of C. Scientific research into alternative energy, sustainable agriculture, recycling, ways to reduce population, and so forth is a form of A. Extremist actions such as sit ins and blocking nuclear test sites are forms of C. So are demonstrations, marches, and publicity stunts. Polls, such as how strongly people support a clean environment, are a form of B. They are “the truth” why decision makers should enforce proper practices.

Why “The Right Inspirational Vision” Will Not Work

Given these two models of system behavior, the dueling loops of the political powerplace and classic activism, let's see where the *Death of Environmentalism's* main solution fits in. This essay was introduced in part one of this series. It is well worth examining in more detail because it seems to embody the very essence of conventional wisdom.

As I read it, the essay's central argument is that environmentalism is failing because it is not promoting The Right Inspirational Vision. The essay hammers this theme home again and again, with assertions like:

“But in their public campaigns, not one of America's environmental leaders is articulating *a vision* of the future commensurate with the magnitude of the crisis.” – Page 6.

“...Our failure to articulate *an inspiring and positive vision.*” – Page 14

“Perhaps the greatest tragedy of the 1990s is that, in the end, the environmental community had still not come up with *an inspiring vision*, much less a legislative proposal, that a majority of Americans could get excited about.” – Page 16.

“...a disturbing sign that, once again, environmentalists are putting the technical policy cart before *the vision-and-values horse.*” – Page 23

“We could find nobody who is crafting political proposals that, through the alternative *vision and values* they introduce, create the context for electoral and legislative victories down the road.” – Page 25.

“Most environmental leaders, even the most *vision-oriented*, are struggling to articulate proposals that have coherence.” – Page 26.

“What’s so powerful about Apollo is not its 10-point plan or its detailed set of policies but rather its inclusive and hopeful *vision for America’s future*.” – Page 27.

“Once environmentalists can offer a compelling *vision for the future*.... And once we have an *inspiring vision* we will have the confidence we need to....” – Page 30.

“A positive, transformative *vision* doesn’t just *inspire*, it also creates the cognitive space for assumptions to be challenged and new ideas to surface.” – Page 31.

The theme of “we must find The Right Inspirational Vision” was so strong the word vision was used 34 times in the 31 page body of the essay. But what exactly does the term mean, as used here? It appears to be an inspiring truth that someone wants others to accept and strive to achieve. In this sense it is a goal. This agrees with Webster’s definition, which is “a vivid, imaginative conception or anticipation.”⁸

I would agree that a vision of where to go is important. But strident insistence that The Right Inspirational Vision is the solution is just plain wrong. It is a seductive trap environmentalists must avoid. The reason is The Right Inspirational Vision is the same as The Right Truth.

A vision is really a collection of perceived truths that a person or group wants to spread to others. Therefore The Right Inspirational Vision is the same as “more of the truth,” which is more of A, B, and C. As the dueling loops of the political powerplace model showed, environmentalists do not have the force necessary to make that solution work, because it uses a low leverage point. And, as the model of classic activism shows, The Right Inspirational Vision is the same as a little of A, a medium amount of B, and a lot of C.

Now we can see the fundamental flaw in *The Death of Environmentalism*. While it was correct in its assessment that environmentalists are failing to achieve their objectives, its argument that the correct way forward is The Right Inspirational Vision is the same as saying, “Let’s wrap a new vision of a sustainable world in a new package, make it compelling and inspirational like we’ve never done before

by adding better values and political appeal, and get people to rally behind it.” While similar strategies did work for other movements, such as racial discrimination and women’s suffrage, “more of the truth” will not work on difficult environmental problems because of the dominance of **The Race to the Bottom Among Politicians**, and the very strong resistance to adopting a solution this causes.

In addition, The Right Inspirational Vision has been tried many times before. One fine example may be seen in the book *Progress As If Survival Mattered*, by Friends of the Earth, 1977. The subtitle was *A Handbook for a Conserver Society*. In 20 cohesive, factual, logical, compelling and inspirational essays, it laid out a complete vision of where the planet and all its citizens needed to go. The first essay, by David Brower (Sierra Club Executive Director from 1952 to 1969), led off with these memorable words:

“What kind of country do you want? What kind of world? What kind of neighborhood on a small planet? If you have asked yourself such questions, we think you will like this book. If you haven’t, you need it.”

Unless I’m missing something, this book and many others provided The Right Inspirational Vision not once but many times. If these visions were going to work, they would have done so by now. But they have not. Our analysis has shown why.

Therefore the environmental movement already has a sufficiently correct and inspiring vision. The global and the American environmental movements, almost from their inception, have pointed out that society, including America, needs to be fully sustainable. Al Gore’s *Earth in the Balance* even laid out “a global Marshall Plan” for how to do that as fast as possible. *Natural Capitalism, Progress As If Survival Mattered* and numerous other works have done the same. In 1992 the United Nation’s Agenda 21 program committed the world community to a comprehensive global vision.

Thus the assertion in *The Death of Environmentalism* that “But in their public campaigns, not one of America’s environmental leaders is articulating a vision of the future commensurate with the magnitude of the crisis” is a false red flag. *They don’t need to articulate such a vision, because it is already there. The problem that remains is the movement has not been able to figure out a way to*

achieve that vision. The goal is there but the means are not.

How might the environmental movement be able to achieve this vision? To find out, we need to examine:

How the Movement Can Go Beyond Classic Activism

Let's resume our discussion of classic activism. That process has three main solutions: A, B, and C. What does the environmental movement do when these fail to work, and opposition not only continues, but becomes even more harsh and hostile? *Almost exclusively more of the same, but stronger.* Why is this?

Jay Forrester not only saw why problem solvers are so often attracted to low leverage points, he also saw why they persist in pushing on those points even in the face of repeated failure. In 1969, he wrote in *Urban Dynamics* that:

“Commonly in complex systems a vicious cycle develops in which the action erroneously assumed to be corrective makes the problem worse and the worsening calls forth still more of the presumed remedial action, which only further aggravates the situation.”

In the case of the global environmental sustainability problem, failing to solve it is making it worse. Corrupt politicians and special interest groups also push back even harder when problem solvers try “more of the truth.” This also makes the problem worse.

Because there is little doubt that global environment degradation is continuing and catastrophe lies ahead unless the problem is solved now, more of A, B, or C is obviously needed. This results in even “more of the truth,” such as The Right Inspirational Vision or a global Marshall Plan. This fails to solve the problem and causes even more pushback. The problem grows worse, causing even more of A, B, and C to be applied. The vicious cycle Forrester identified grows and grows.

Basically, since classic activism has no other solution strategies than the above, it piles error upon error by continuing with more of A, B, or C. What else can environmentalists do?

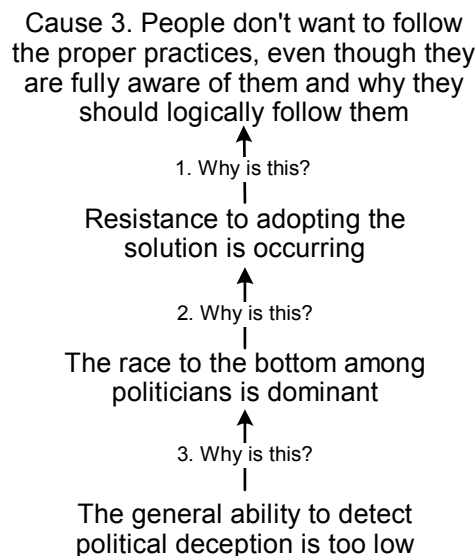
Just as scientists did in the 17th century when they adopted the Scientific Method, environmental-

Some environmentalists are beginning to see that more of the same is not going to work. For example, one member of the Sierra Club, even before reading these articles, wrote me: “I do concur that there is a more general frustration within the Club and larger environmental community at not achieving their/our collective goals. As you imply, the same themes are repeated over and over in endless alerts calling for the same decreasingly effective behavior by activists, and fostering a growing suspicion by the grassroots that ‘this is just not working.’ ”

ists could face reality, admit their error, and adopt a process tailored to the problem type. For environmentalists this could be something like the System Improvement Process. Step 2.1 asks the question, “Why is there such strong resistance to adopting the solution?”

Nowhere in classic activism are problem solvers asking that question deeply. If they did, they would abandon putting so much effort into solution C and replace it with a problem solving branch that would look like the one shown below.

By asking a series of the correct “Why?” questions, problem solvers would soon arrive at an ade-



quate explanation for the reason cause 3 is occurring. The diagram shows that in this case it takes three high level why questions to do this. Let's walk through them one at a time.

By now it is painfully obvious that *People don't want to follow the proper practices, even though*

they are fully aware of them and why they should logically follow them. This leads to the first why question: “Why is this?”

The process has anticipated the question because it occurs so often in complex social system problems. The reusable answer is *Resistance to adopting the solution is occurring*. If problem solvers were following a suitable process, it would lead them this far, and then ask “Why is this?” a second time.

The answer, as we explained above, is *The race to the bottom among politicians is dominant*. However we are not done. The process says to keep asking why until you have fully answered the first why question.

Finding the answer to the second why question required building a simulation model of the problem. The model shows that under present conditions the race to the bottom is dominant. This makes answering the third why question, “Why is this?” relatively easy, because we know the structure of the social system involved. The answer is *The general ability to detect political deception is too low*.

Classic activism has failed to solve the global environmental sustainability problem because as a process, it does not ask these why questions. Because it doesn’t ask them, it has not discovered that:

There Is a High Leverage Point that Has Not Yet Been Tried

We have extremely good news. There is a high leverage point in the human system that has not yet been tried. It is what the third why question found: *the general ability to detect political deception is*

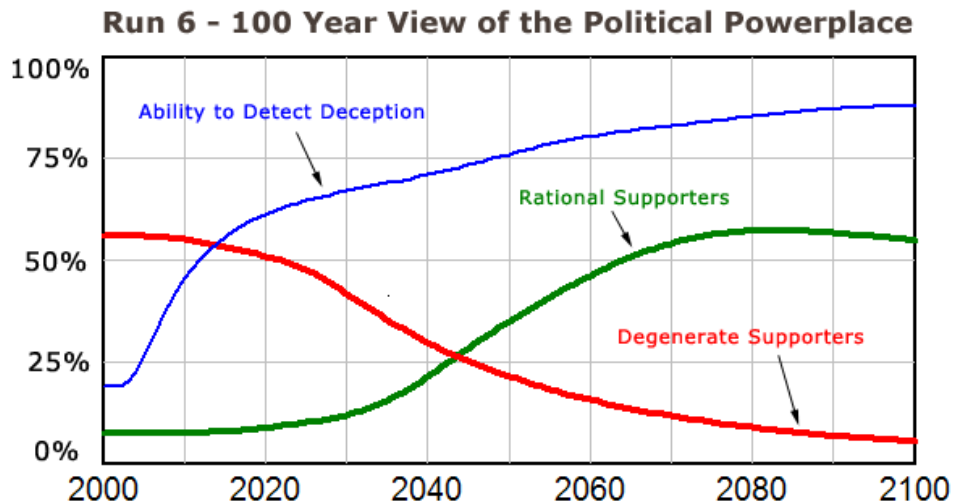
too low. Pushing there appears to give problem solvers the greatest possible chance of solving the problem.

The dueling loops model presented here is simplified. It doesn’t show general ability to detect political deception. This affects how well falsehood and favoritism work. If ability to detect deception is low, then it works like a charm. But if it is high, then it doesn’t, and the race to the bottom cannot collect as many supporters as the race to the top.

My estimate is that currently the general ability to detect political deception is low, somewhere around 20%. A simulation model of the political powerplace using the dueling loops and other factors shows what would happen if the ability to detect deception was raised. As shown in the graph below, as ability to detect deception rises to about 50%, the race to the bottom (degenerate supporters) begins to collapse. As it rises still further to 80% or more, the race to the bottom collapses altogether, and the race to the top (rational supporters) becomes dominant.

Notice how the percentage of degenerate supporters starts at much more than the percentage of rational supporters. This is what we mean when we say “the race to the bottom is dominant.” After the ability to detect deception is raised this is reversed. The new state is “the race to the top is dominant.”

The graph shows crossover (when dominance shifts from the race to the bottom to the race to the top) takes over 40 years. Because the model is not yet calibrated (the numbers used in it are estimated, not measured), this is not an accurate prediction. However, it does look like it will take a long time. Will it take too long? That is one of the great questions facing problem solvers and civilization.



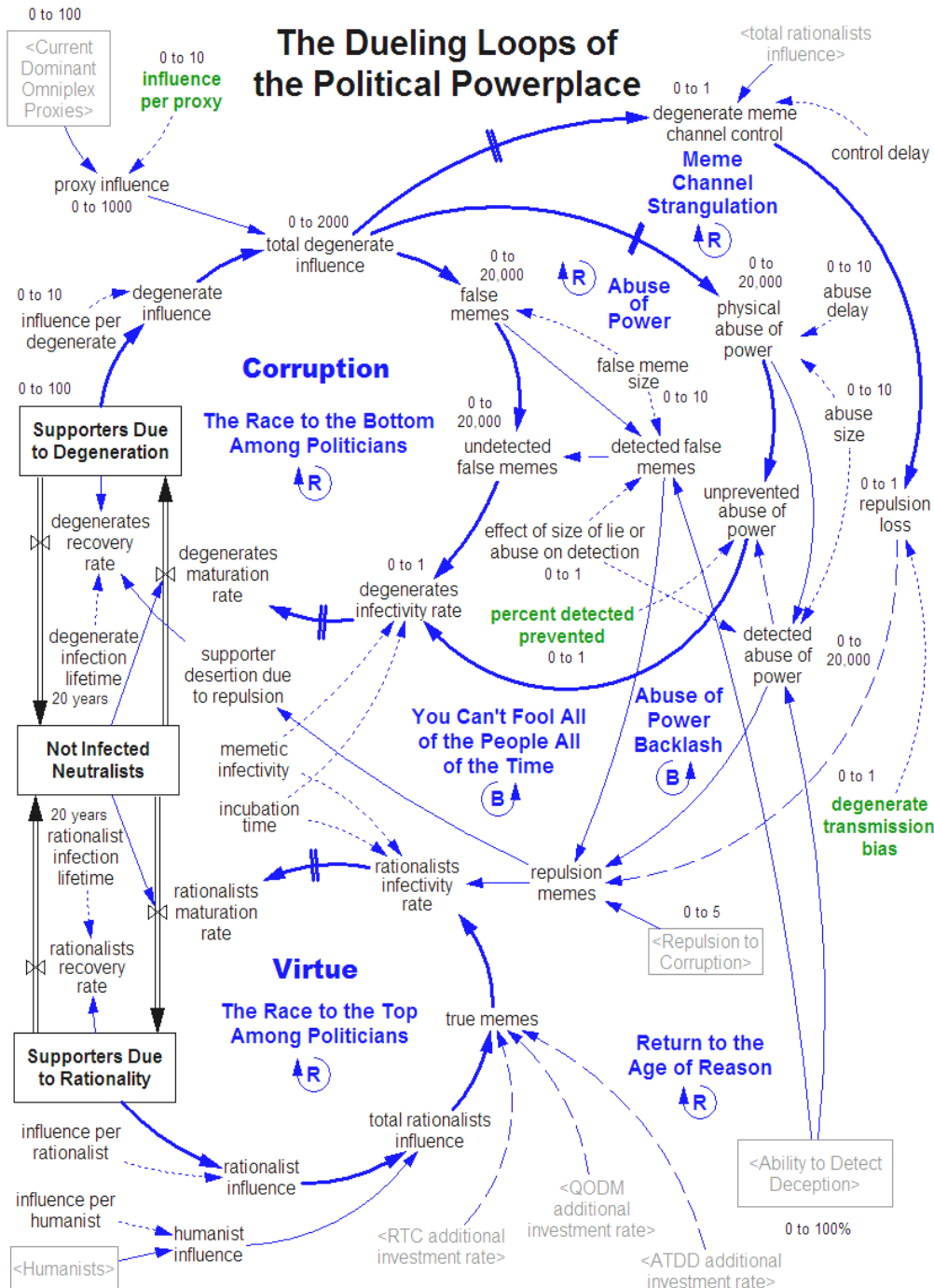
How problem solvers could best push on this high leverage point is covered in part three of this article series. The simulation model behind the graph and a manuscript going into much further detail is online at www.thwink.org/sustain.

Ability to Detect Deception can be seen at the lower right of the diagram below, which we will not discuss in detail here. This is a “stock and flow” simulation model, the same type so successfully used in *Urban Dynamics* and *Limits to Growth*.

The diagram shows the key subsystem of the actual simulation model explaining why solution

adoption resistance is so strong. Note the seven well named feedback loops. It is these loops that appear to explain the fundamental reasons why the political powerplace behaves the way it does, and where the low, medium, and high leverage points are. Once problem solvers know how to read models like these, the social systems they represent become as transparent and predictable as is humanly possible.

Environmentalists must be able to discuss models like this fluently if they are to have any hope of developing effective solution strategies for difficult problems. Hopefully the day will come when, in-



stead of endlessly debating inspiring visions and classic activism strategies that seem to fail repeatedly, when environmentalists get together they will spend most of their time excitedly drawing models on anything they can get their hands on, such as walls and watermelons. They will be trying to name their feedback loops with insightful, memorable terms that evoke exactly what each loop does. Discussions will become centered on trying to find a comprehensive model that explains each issue they are concerned with. This is because once these models of understanding exist, system behavior becomes predictable. And once that occurs, the effect of alternative solutions becomes so predictable that converging upon the final solution is now, as they say, child's play.

Summary and Conclusions

We promised to explain why environmentalists are facing such hostile opposition. The reasons are subtle. Finding them requires the systems thinking tool of modeling and the use of a process tailored to the problem type, such as the System Improvement Process.

By going beyond the technical side of the sustainability problem to the social side, which is the crux of the problem, we arrived at the dueling loops model. This consists of the race to the bottom among politicians battling against the race to the top for the same supporters. Whichever loop can offer uncommitted supporters the most perceived benefits wins.

The race to the bottom has an inherent structural advantage over the race to the top. This causes the race to the bottom to be dominant most of the time. Because the race to the bottom requires generous amounts of falsehood and favoritism to work, that is what characterizes politics today.

The modern corporation and its allies is the New Dominant Life Form. Because it is the dominant special interest, it controls the race to the bottom, and thus the political systems in industrialized countries. It doesn't control all of each system, but it controls enough to cause the rules of the game to be defined in its favor. It also controls enough to acquire the favoritism needed to remain dominant.

Corporations are each in their own life or death struggle, based on who does the best at maximizing the net present value of profits. This causes the life form as a whole to be locked into a preference for unsustainable behavior. Because corporations are

the dominant life form, this in turn causes the entire system to be locked into the mode of unsustainability.

There is no one reason, no one root cause, why environmentalists are facing such hostile and successful opposition. Rather it is a multiplicity of factors which have caused the structural dynamics of the social side of the system to behave this way. Hostile and successful opposition to sustainability is an emergent property of the structure of the system.

Because the structure of the human system is largely invisible, most problem solvers have responded by pushing on an inviting but low leverage point. This is to spread as much truth as possible about the environmental sustainability problem, and hope that people will see why solving it proactively is in their own best interests and take appropriate action.

This solution, known as classic activism and "more of the truth," has become the *modus operandi* of the environmental movement, and is thus the only solution the movement has. It works on easy problems but fails on the difficult ones, which includes the most urgent problem of them all: climate change. Despite repeated failure, different versions of this solution keep reappearing ad infinitum, *because environmentalists have no other solutions.*

A key finding of the analysis is that "more of the truth" is a low leverage point. *Pushing on this point fails because it is no more than a heavy handed, naive attempt to make the race to the top dominant through the application of brute force.* It does not consider that the race to the bottom is inherently stronger and has a more powerful special interest group behind it. Thus conventional solutions have no hope of succeeding, unless the laws of physics change or a "wakeup call catastrophe" occurs in time. Neither appears likely.

Fortunately there is a way out. It is the high leverage point of ability to detect deception. Currently this is low. If problem solvers can raise it to a high level the race to the bottom will collapse, leaving the race to the top dominant. Decision makers will then respond to the truth about the global environmental sustainability problem because it will now be in their best interests. If they come to the same conclusion that environmentalists have, that sustainability is civilization's top priority and nothing else comes close, then civilization may at long last enter the Age of Transition to Sustainability.

How to Raise General Ability to Detect Political Deception

What we are about to present may sound hopelessly naïve. At first glance it may appear there is no earthly way it could work. Indeed, this is the way people reacted at first to Jay Forrester’s analysis of the urban decay problem. As the first article in this series related:

“The conclusions of our work were not easily accepted. I recall one full professor of social science in our fine institution at MIT coming to me and saying, *‘I don’t care whether you’re right or wrong, the results are unacceptable.’* So much for academic objectivity! Others, probably believing the same thing, put it more cautiously as, *‘It doesn’t make any difference whether you’re right or wrong, urban officials and the residents of the inner city will never accept those ideas.’*“

What is really happening here, at the deepest appropriate level of abstraction? The 19th century German philosopher Arthur Schopenhauer knew exactly. He put it this way, in what has become one of the most well known quotes in the advancement of science:

“All truth passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as self-evident.”

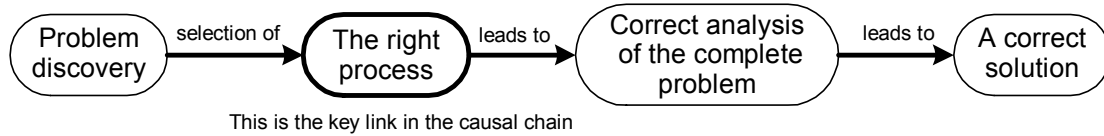
The articulate, intelligent man from Harlem in Forrester’s story passed through these three stages in a matter of days. On Monday he ridiculed what Jay Forrester was presenting when he said, “I come from Harlem and there’s certainly not too much housing in Harlem.” Next, as one of Forrester’s students reported Tuesday evening, “the group was very hostile.” At that point the man was in the second stage. Four days later when he said to Forrester, “You know, it’s not a race problem in New York at all, it’s an economic problem,” he had reached the third stage. He had accepted the full truth of the model of urban dynamics, along with its counter-intuitive but undeniable conclusions.

I now ask you to put yourself in that man’s shoes, because the truth that is about to be presented may be just as unacceptable—at first.

The truth is that if experimental confirmation shows the analysis presented in part two to be sound, then the solution elements presented in part three have a high probability of solving the problem, however unconventional and counter intuitive they may appear to be.

However, this is part of an even greater truth, a greater conceptual whole. This is the causal chain that leads from problem discovery to successful solution when the proper problem solving process is applied. How this looks is shown below:

The Complete Problematique Chain



Emphasis on “the complete problematique” is a systems thinking concept promoted by Aurelio Peccei, an Italian industrialist who founded the Club of Rome in 1968. His point was that for the incredibly complex and interlocking problems global society now faces, only a sufficiently complete analysis of the meta-problem can realistically expect to solve any of the subproblems.⁹

The above chain holds only if each link in it is strong. As Aurelio Peccei so presciently observed over 30 years ago, a correct solution can only follow a correct analysis of the complete problem.

Let’s review the process presented and used in these articles. The System Improvement Process has these four steps:

1. Problem definition
2. System understanding
3. Solution convergence
4. Implementation

The chain starts with *Problem discovery*. Unless it is a simple problem, the next step *must* be selection of *The right process*. Applying the right process leads to *Correct analysis of the complete problem*, which is steps one and two of the System Improvement Process. If this is done well, then the analysis leads to *A correct solution*, which is steps three and four of the process.

If this chain is conceptually sound, then failure to solve the problem can only be due to one or more weak links in the chain. Failure to solve the problem has clearly occurred. This forces us to ask: Which link or links in the chain are weak?

My conclusion is that the second link in the chain, *The right process*, is the culprit. My reasoning on why this is so runs like this:

In 1972 the international bestseller *Limits to Growth* brought the global environmental sustainability problem to the world’s attention. This and other events spawned the modern environmental movement. Since then millions of environmentalists have relentlessly attempted to solve the problem. Some success has occurred. But this has been only on the easy problems, the low hanging fruit. The more difficult problems, which are the ones where solution adoption resistance is strong, remain unsolved.

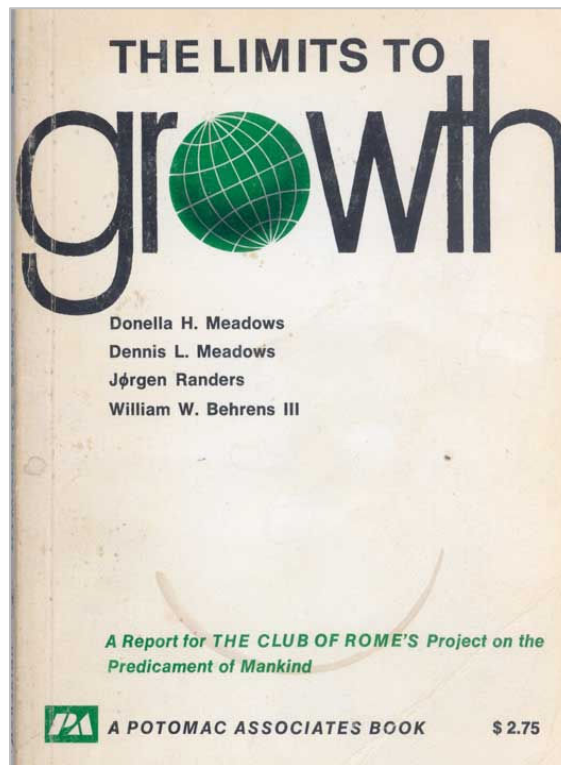
Here is a hypothesis for why this happened: *Limits to Growth* (as well as most other efforts) analyzed only the *technical side* of the sustainability

problem. By modeling only the environmental, economic, demographic, and technology aspects, it left out the *social side* of the problem. *This is the crux of the problem*. In general, society knows what it must do: live sustainably, which is the technical side. But for rational reasons many powerful agents refuse to do so. This causes change resistance, which is the social side of the problem.

It appears no one has addressed the social side of the problem successfully, because the processes used (particularly classic activism) have not gone far enough beyond the analysis introduced in *Limits to Growth* in 1972. *Thus the next step is to use a*

process that includes the social side, such as the System Improvement Process. This will allow us to tackle the complete problematique, in a manner comprehensive and mature enough to solve it.

This leads to the most fundamental truth of them all. It is the one that environmentalists *must* accept fully, if they are to improve their operative model and have any rational hope of solving the



problem in time. *This is the critical importance of using the right problem solving process.*

Thus if the modern environmental movement wants to succeed, it must acknowledge this new truth, and build the proper second and third links in the chain. This will lead to a strong fourth link, which is the real goal of the chain. Doing a good job of this will probably require a collective effort, such as a coalition of leading environmental organizations, because of the large amount of investment, experimentation, coordination of effort, and expertise required. Or perhaps one bold organization will lead the way.

The right process link is the key link, because if it is strong, then the chain will hold. But if it is weak the chain will usually not hold, because the next link will usually not be a correct analysis. That is exactly what has happened here, and so the chain is broken. The result is the complete problematique has never been fully and correctly addressed.

Applying the Right Process

The right process, as Jay Forrester and so many others have shown, is a process with the right steps and the right tools for the problem at hand. If problem solvers take the wrong steps and use the wrong tools, then no matter how hard and long they try, a truly difficult problem will not yield to even heroic efforts except by luck. That occurs so seldom that it would be more than a little irresponsible to bet the future of *Homo sapiens* on the wrong process.

This article series is a modest demonstration of what happens when the right process is applied to the global environmental sustainability problem. To maximize the chance of solving this problem, as well as the other complex social system problems that have become entangled with it, in 2001 when I began work on this problem I paused and took the time to design an appropriate process from scratch. This is the System Improvement Process. As described in the first article in this series, it has four simple steps.

The first step is Problem Definition. The second step is System Understanding. It is where problem

solvers should spend about 80% of their time. *If the all important second step is done well, problem solvers (and anyone else, including decision makers) will understand the system with the problem so deeply and correctly that the third step, Solution Convergence, is almost trivial.* Problem solvers will

understand the system so completely that they can predict, within a broad range, how it will respond when low, medium, and high leverage points are pushed on. Solution Convergence then becomes a simple matter of selecting a reasonably straightforward way to push on the high leverage points. Because the correct points will be used, almost any form of pushing on them will do. *A seemingly trivial solution is the payoff for using the right problem solving process.*

Part two of this series concluded that the general ability

to detect political deception was the key high leverage point. If problem solvers can raise it to a high level, then the race to the bottom among politicians will collapse, leaving the race to the top dominant. Politicians will now be competing on the basis of who can provide the most benefits to society as a whole, based on the objective truth. It will not take them long to realize that their top priority needs to be global environmental sustainability, causing that problem to finally receive the full attention and commitment it deserves.

But that will never happen unless the general ability to detect political deception can be raised from low to high.

The Solution Convergence step of the System Improvement Process discovered it takes six solution elements to achieve this. The first is the foundation for all the rest. It is:

Freedom from Falsehood

Hindsight sharpens the vision. Most difficult social problems have, in retrospect, a surprisingly simple solution. Looking back at history, it almost seems the bigger the problem, the simpler the solution. For example, the Magna Carta of 1215 introduced the idea that a ruler's subjects have rights that must be respected by law. The invention of democracy gave a population the right to choose its own

As you read this article, try to view it from at least two angles. One is that the solution presented may have a much higher probability of working than past solutions, because it is the product of a continuously improved problem solving process tailored to the problem, rather than a solution based on intuition and no formal process.

The other is that what I'm presenting in these articles is an approach to solving the problem and a sample analysis and solution to illustrate the approach. It is not intended to be *the* analysis or *the* solution.



The Greek philosopher Diogenes (412 to 323 BC) living in a broken tub with his lamp nearby. When asked why he went about with a lamp in broad daylight, he famously replied, “I am looking for an honest man.” Perhaps even more importantly, Diogenes was the first known person to say, “I am a citizen of the whole world.”

leaders. The ending of serfdom and slavery gave serfs and slaves the right to freedom from control by their former masters. Each of these solutions solved an age old, seemingly intractable problem with a solution so simple that we can now describe it in a single sentence.

Civilization remains saddled with a problem that is every bit as debilitating and exploitive as any problem the solutions above solved. Ever since politics began, corruption has been the norm. Corruption is so rampant that a “good” politician is not the one Diogenes could hold a lamp up to and say, “This is an honest man.” Instead, a good politician is one who is the least corrupt. That we are forced to choose from the lesser of the evils is pathetic and perverse.¹⁰

But this need not be so. Diogenes would find an honest politician every time he held up his lamp if people had the right to Freedom from Falsehood.

Freedom from Falsehood gives people the right to freedom from falsehood from sources they must be able to trust. This includes all “servants” of the people, such as politicians, public employees, and corporations. A *servant* is an agent created or employed by *Homo sapiens* to do something useful. All servants must remain subservient to *Homo sapiens* and keep the interests of humans above their own.

What is not prohibited by law is permitted by implication. Therefore if people do not have the legal right to freedom from falsehood, then by implication it is okay for those in positions of power to manipulate citizens by the use of lies, fallacies, the sin of omission, and all the forms of deception, propaganda, and thought control available.

Corruption relies on the use of falsehood to hide or rationalize favoritism. Eliminate falsehood, and you have eliminated favoritism. This is because once falsehood is banished, politicians will be forced to compete for supporters on the basis of the objective truth. The truth includes the long term optimization of the general welfare of all members of *Homo sapiens*. Favoritism conflicts with this goal because it gives someone more than his or her fair share, and hence someone else less. This promotes the welfare of an elite few, rather than that of the many, so it is not the optimal allocation of a society’s resources.

If “we the people” do not have freedom from falsehood, then falsehood in all its Machiavellian and Orwellian forms will continue to appear again and again, because it is the surest way to *rise to power, increase power, and stay in power.*

However this new right alone will do little good unless falsehood can be detected. This is why we need:

The Truth Test

The Truth Test is a personal skill, much like other skills such as frugality, language, and mathematics. It is designed to handle nearly all arguments the average person receives in seconds or minutes. The rest take longer or an expert.

The objective of the Truth Test is to reduce deception success at the individual level to a very low, acceptable amount. It consists of four simple questions:

1. What is the argument?
2. Are any common fallacies present?
3. Are the premises true, complete, and relevant?
4. Does each conclusion follow from its premises?

The Truth Test allows people to see the widespread fallaciousness of the arguments they receive from corporate proxies, such as corrupt politicians, many news sources, and articles. Once citizens can no longer be fooled by unsound arguments, they will elect better leaders and support better positions.

We certainly don't expect the general population to master the Truth Test very soon. But we do expect those performing Truth Ratings (described below) to do so, as well as those who are trying for high Truth Ratings.

As the general population sees the published Truth Ratings and occasionally reads the details behind a rating they are particularly interested in, they will get a long, gradual exposure to how the Truth Test works. This and more direct educational efforts will gradually lead to *truth literacy*, which is the ability to tell truth from falsehood.

Universal truth literacy is just as important to society as reading literacy, because if people cannot "read" the truth, then they are blind to what the truth really is.

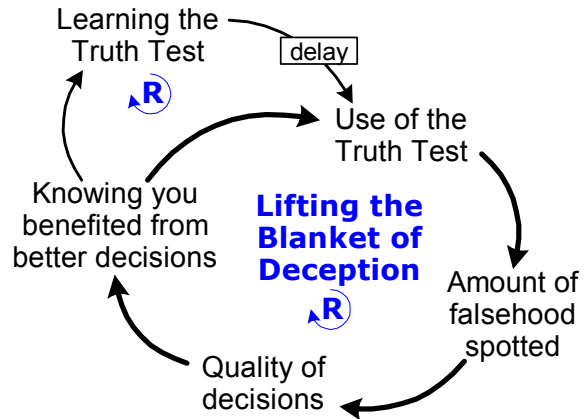
The average person is never taught anything like the Truth Test in school or the workplace. *Thus their immunity to deception is largely a matter of cultural chance.* For truth literacy to become a cultural norm and achieve its full success, it must become as essential to a person's education as reading and writing.

History has shown again and again that those who are not truth literate become the unknowing slaves of the masters of falsehood, as the cyclic nature of the race to the bottom versus the race to the top plays itself out over and over. A cycle ends when corruption becomes so extreme that the people rise up, throw the bums out, and become much harder to deceive for awhile. But as good times return, people become lax, and another cycle begins. These cycles never end, because presently there is no mechanism in the human system to keep ability to detect deception permanently high.

The appalling effects of this cycle, during which corrupt politicians and special interests are dominant most of the time, is historic evidence that truth literacy is more important to society than reading literacy. This applies even more so today as we enter the 21st century, because if the truth is not seen in time, *Homo sapiens* will surely perish by his own hand.

How the Truth Test Works Dynamically

Implemented properly, the Truth Test is true structural change. It works by introducing the reinforcing feedback loop shown below,:



First a person must learn the Truth Test. Once learned, *Use of the Truth Test* increases the *Amount of falsehood spotted* on everyday arguments. This increases *Quality of decisions*. Once a person perceives this has happened, an increase in *Knowing you benefited from better decisions* occurs. This causes that person to use the Truth Test even more, and the main loop starts over again.

Let's examine the side loop. *Knowing you benefited from better decisions* will increase *Learning the Truth Test* in the general population. This occurs when people realize that if they study the test more, they can handle a broader range of arguments and make better analyses. Or there may be a particular type of argument they would like to handle better. After the *delay* of learning, there will be a tendency to use the test more, because now it can offer them even greater benefits.

Nothing can grow forever, so these reinforcing loops have balancing loops associated with them. Examples are the increased time and cost of using the test, and the increased complexity or cleverness of arguments. Each of these causes diminishing returns, which keeps the **Lifting the Blanket of Deception** loop from growing forever. For simplicity these additional loops are not shown.

The Truth Test provides a way for citizens to spot the truth. But it is a bit of a stretch to expect that truth literacy will sweep the world soon. The Truth Test also provides no incentive whatsoever for corrupt politicians to start telling the truth. For that we need:

Truth Ratings

Truth Ratings would provide an accurate measure of the truth of what key politicians are saying and writing. If this objective can be achieved, then construction of a new reinforcing loop causing virtue to triumph over corruption in the political arena becomes possible. *Once this new loop is established, it become increasingly difficult for political deception to succeed.*

Truth Ratings work by rating the truth of important statements made by important politicians. They are similar to other types of ratings that have been around for a long time.

Credit ratings quantify the creditworthiness of a person, organization, or government. Product ratings, such as those in Consumer Reports magazine, quantify the worthiness of products. Both are widely used. Truth ratings would quantify the truthfulness of important arguments, such as those in political statements, articles, and so on.

A truth rating is the probability an argument is true. For example a few days after a presidential debate, its truth ratings would come out. They might say that candidate A averaged 45% true, while candidate B averaged 70%. Guess which candidate would probably win the debate in the public's mind?

If the organization doing the rating was credible and the public trusted the truth ratings, a race to the top would begin. Politicians would compete to see who could be the most truthful in the fullest sense of the word, and therefore the most helpful. Campaigns would become based on reason and truth rather than rhetoric. Due to a trickle down effect from the successful use of Truth Ratings, a race to the top would also begin in many other areas of society where less than the truth has long prevailed, such as advertising, the appeals of special interest groups, editorials, and to a growing degree, the news.

No one person can become an expert on the many critical issues of our day and spend hundreds and sometimes thousands of hours analyzing each important political argument they encounter. Therefore the public has no choice but something like Truth Ratings.

Instead of individuals continuing the impossible task of deciding the truth of each important argument, rating organizations would do that. Certified rating organizations would *quantify* the truthfulness of important arguments by applying the Truth Test and providing a written rationale for each rating, so

that the public could make its own final judgment. As they read more about the logic behind ratings of interest, the public would gradually become educated in how to apply the Truth Test.

However, the truth of political arguments is not the only behavior that needs to be rated in order to establish the correct feedback loops. The overall corruption of politicians must also be rated. This is done with:

Corruption Ratings

A Corruption Rating is an overall measure of how corrupt a politician is. Corruption includes falsehood, favoritism, coercion, abuse, criminal activity, the giving or accepting of bribes, knowledge that corruption is going on, and so on.

A major component of a politician's Corruption Ratings is past Truth Ratings. This would account for 40% or so of the rating. As a politician's Truth Ratings go up, his or her Corruption Rating would go down.

Corruption Ratings would need to be done regularly, perhaps every two years. The running average of the last ten years or so would be a politician's rating. Corruption Ratings would become as routine and cost about as much as a high level security check.

Truth Ratings and Corruption Ratings are examples of *politician ratings*. They would be calculated in a similar manner by certified independent organizations. Both could cause the race to the top to become dominant. Because it measures total corruption, Corruption Ratings would play the stronger role. However Truth Ratings are easier and cheaper to perform, and thus would probably make a difference first.

The Analogy of Credit Ratings

Politician ratings are analogous to credit ratings. To demonstrate how important credit ratings have become in just one area, the corporate bond market, here is an excerpt from testimony presented to the US Senate on March 20, 2002, to the Committee on Governmental Affairs, chaired by Senator Joe Lieberman: ¹¹ (*italics added*)

“Simply put, a credit rating is an assessment of a company's credit worthiness or its likelihood of repaying its debt.

“John Moody, the founder of what is now Moody’s Investors Service, is recognized for devising credit ratings in 1908 for public debt issues, mostly railroad bond issues. Moody’s credit ratings, first published in 1909, met a need for *accurate, impartial, and independent information*.

“Now, almost a century later, an ‘investment grade’ credit rating has become an absolute necessity for any company that wants to tap the resources of the capital markets. The credit raters hold the key to capital and liquidity, the lifeblood of corporate America and of our capitalist economy. The rating affects a company’s ability to borrow money; it affects whether a pension fund or a money market fund can invest in a company’s bonds; and it affects stock price. *The difference between a good rating and a poor rating can be the difference between success and failure, prosperity and bad fortune.*”

In a similar manner, the difference between a good politician rating and a poor one would be the difference between success and failure for politicians, and prosperity and bad fortune for the public.

But even more interesting is the testimony went on to say:

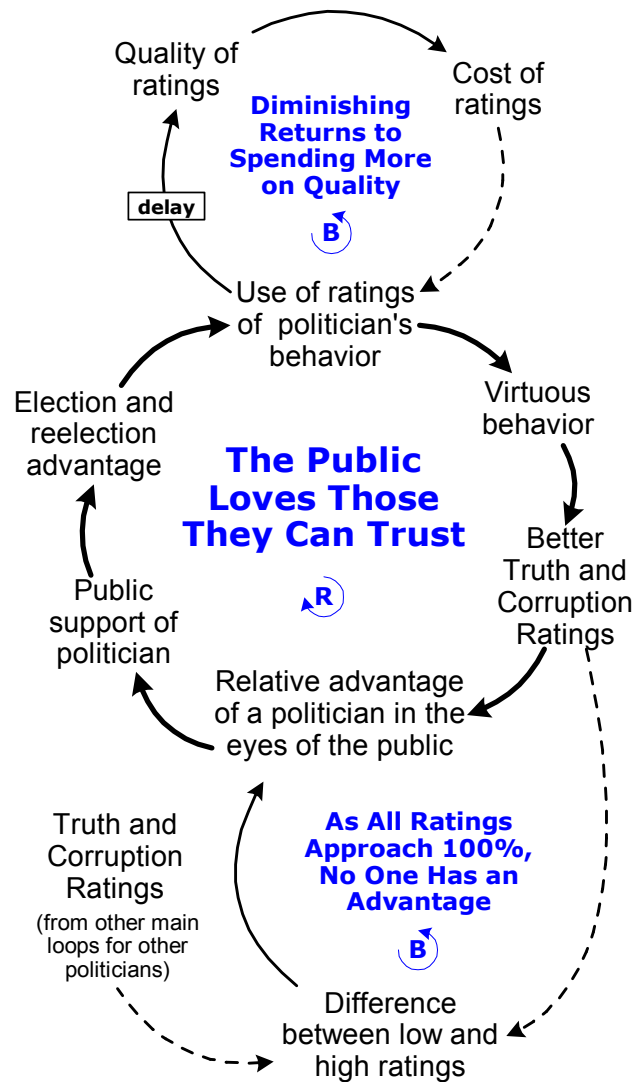
“The government - through hundreds of laws and regulations - *requires corporate bonds to be rated* if they’re to be considered appropriate investments for many institutional investors.”

So too would the government require politicians to be rated if they were to be considered appropriate choices for many citizens. Credit ratings greatly lower the risk of financial loss. Corruption Ratings would greatly lower the risk of corruption. If they proved as successful as credit ratings, they would lower it by somewhere around 99%, which would make sizeable cases of corruption about as frequent as Halley’s Comet.

Presently Corruption Ratings are not required but corporate bond ratings are. This is one more example of how, over the centuries, the New Dominant Life Form has silently and relentlessly defined the rules of the game to be in its favor.

How Politician Ratings Work Dynamically

Like all deep structural change, politician ratings would cause important new feedback loops to become dominant. A diagram of these is shown below. The main loop is **The Public Loves Those They Can Trust**. *This is probably the most important feedback loop in the entire solution, because if it works, the whole solution will probably work.*



Let’s start at the top of the main loop, on the *Use of ratings of politician’s behavior* node. Suppose that node is activated because ratings have been implemented and are being regularly published for a few politicians. The ratings would at first be embarrassingly bad.

This would cause a politician being rated to want to improve the quality of his or her behavior in order to get better ratings. This causes an increase in *Virtuous behavior*, which would lead to *Better Truth and Corruption Ratings*. This would increase the *Relative advantage of a politician in the eyes of the public*, because the public can now reliably tell whose arguments are more truthful and whose overall behavior is less corrupt, and thus who is a more trustworthy representative and more likely to get better results. This would increase *Public support of the politician*, which would, in turn, increase their *Election and reelection advantage*. The politician would know this happened. They would also know this benefited the people, so he or she would promote the *Use of ratings of politician's behavior* so as to gain an even larger advantage and more benefits for the people. The loop then starts over.

Because politicians would now be competing to get better and better in the quality of their behavior, a race to the top among politicians would begin. This would cause the race to the bottom to collapse, because its supporters would switch to the race to the top.

The effect of ratings on the behavior of *Homo politico* would be astounding. That sub species would be singing “The public loves those they can trust, those they can trust,” and other little ditties all the way to election day, and after that, to the next election day. *Homo citizenicos* everywhere would applaud, and join the chorus.

It is essential to understand the balancing loops that accompany the main loop. If problem solvers don't comprehend how the balancing loops work, they may be unable to design the most effective solution aspects, or they may have difficulty figuring out what went wrong if things go awry in implementation. *They may fail to understand what is limiting how far the race to the top can go, so they may be unable to make it go far enough.*

How the balancing loops work is too involved to cover in this brief article. For those curious about this, as well as the rest of the issues raised in this article, please see the manuscript.

Returning to our discussion, what if there is no way for truth and corruption raters to get the facts they need, because they are hidden behind a wall of secrecy? This is why we need:

No Servant Secrets

The objective of No Servant Secrets is to prevent servants, particularly politicians and corporations, from using secrecy to their own advantage.

This is accomplished by complete openness in all that a servant does. *No servant may keep competitive secrets of any type, either from their masters or other servants.* After all, if a servant is an entity created or employed by the hand of man to provide him with goods and services, why should a servant need to keep any form of competitive advantage secret, except to gain advantage over its master or other servants?

Competitive secrets are a form of non-sharing and hence a form of non-cooperation. When combined with the mutually exclusive goals that servants have of each maximizing something, such as profits, this leads to a *destructive competition* mindset. But what we want is *constructive competition*, where agents compete in a friendly, let's help each other manner. It appears that removing competitive secrets takes independent agents one step closer to cooperation. Therefore full and complete cooperation between servants and their masters, as well as between servants, requires no competitive secrets.

No Servant Secrets is short for No Competitive Servant Secrets. It covers many areas. Some could be tackled soon. Others would take time. A few are counter-intuitive and controversial, though less so as the analysis and solution strategy is more fully absorbed. Ultimately all would be dealt with, because a servant that keeps competitive secrets from its master has time and time again proven to be a danger to its master. The transition would probably take several generations.

No Servant Secrets is part of the Servant Re-alignment Package, which has eight solution elements. Together these serve to reengineer the modern corporation so that its interests no longer conflict with those of *Homo sapiens*. Because there are so many elements, a very flexible, as-needed approach can be taken.

No Servant Secrets is already spontaneously appearing in the form of freedom of information acts, sunshine laws, and so forth. But these are a haphazard collection of ways to reduce servant secrecy. Competitive secrecy needs to be reduced to zero in a comprehensive manner, which No Servant Secrets finally does.

One type of servant secret is government secrecy. A standard objection to eliminating government secrecy is the need for “national security.” However this objection is really designed to benefit one country (and its military industrial complex) at the expense of others. Military secrecy is a form of competitive advantage. If countries truly want to cooperate instead of compete, then there is no need for military secrecy.

The standard rebuttal to this argument is that if I can't keep secrets and my competitor can, then they will gain an advantage over me. Rubbish. The same logic can be used to argue if I can't steal and my competitor can, they will gain an advantage. We have all seen that it is to society's benefit as a whole to outlaw theft. The same is true for secrecy. A country insisting on military secrecy is a country refusing to cooperate for the common good of all.

Because national security secrets increase the destructive competition mindset, they increase international conflict and/or preparation for it, which in turn increases the sales and profits of military goods and services. This benefits the military industrial complex, and hence the New Dominant Life Form. But it does not benefit Homo sapiens. In fact, international conflict or the diversion of national output to military purchases (the guns or butter choice) does just the opposite.

Servants include corporations. No Servant Secrets would mean the end of all competitive corporate secrecy. No longer could corporations ply politicians with secret favors and donations, or secretly influence political decision making. No longer could they secretly receive political favors. Because all this would now be out in the open, it would stop, because corporations are loathe to draw criticism from the people or the press.

Corporate secrecy includes trade secrets, which would no longer be allowed. The standard defense of trade secrets is they are necessary to provide an incentive for invention. Without trade secrets, a corporation could not make enough profit to pay for innovation.

This argument is fallacious. If corporations are servants and are truly working for the good of their masters, then the incentive to innovate should come from the desire to serve their masters the best they can, rather than to serve themselves as best they can. Trade secrets are really a form of selfishness.

Trade secrets are not necessary for scientists to innovate. Nor were they necessary for the long his-

tory of innovations that occurred up to modern times.

The real reason corporations want trade secrets is they are a form of competitive advantage. This greatly increases profits. But why should humans allow their servants to have any form of competitive advantage over other agents, which includes humans? There is no good rebuttal to that or the points raised above. Therefore trade secrets are not necessary and, because they are a form of secrecy that can be abused, they would not be permitted.

If any type of competitive advantage servant secrecy is allowed, then servants can use that as an excuse to hide all sorts of corruption from their masters. Thus No Servant Secrets means exactly that: No Competitive Servant Secrets of any kind.

Certain forms of non-competitive advantage servant secrecy would be allowed, such as passwords. This is because passwords serve as identification and ownership identifiers, rather than as a form of competitive advantage. Other allowed types involve personal information, law enforcement, jury deliberations, and so on.

A special note: Several careful readers have suggested that the section on No Servant Secrets be removed because it makes it too easy for the opposition to find a spot to attack successfully. But without No Servant Secrets, there is no way to fully and accurately implement Truth and Corruption Ratings. If servant secrets continue to be allowed, so much of the data needed for ratings will remain hidden behind a wall of secrecy that ratings will probably fail. Thus No Servant Secrets is *the* prerequisite for creating the key new feedback loops necessary to eliminate the current dominance of the race to the bottom.

* * *

Let's assume that we have implemented the first five solution elements. These are Freedom from Falsehood, the Truth Test, Truth Ratings, Corruption Ratings, and No Servant Secrets. Would this be enough to raise the level of ability to detect political deception to a high enough level to solve the global environmental sustainability problem?

Not quite, because it lacks a measure of problem solving success. Lack of this has allowed many politicians (really corporate proxies) to more easily deceive the public, and has dissipated problem solving effort.

The measure of problem solving success would be:

The Sustainability Index

The top problem facing humanity today is the global environmental sustainability problem, because due to large social and ecological delays, it must be resolved proactively *now* to avoid catastrophe later. To trick the public and politicians into not solving this problem now, there is a tremendous fear, uncertainty, and doubt (FUD) campaign underway. This campaign has been so successful that millions of citizens, corporate managers, and politicians have been hoodwinked into thinking that the problem does not even exist, is not that bad, is too expensive to solve, lies too far in the future to worry about, or is so full of uncertainty solution is not required. Environmental sustainability has become such a low priority, especially in the US, that it is no longer a significant factor in elections or the national agenda. The corporate FUD campaign has worked all too well.

But it could be stopped in its tracks if citizens and politicians could look up and see, every day, a number that told them point blank how bad the problem really is and a graph showing where the trend is going. The Sustainability Index would provide exactly that. It would be an accurate, universally understandable measure of how well society is doing on solving the global environmental sustainability problem.

Instead of *fear* about the problem being too expensive to solve, there would now be fear about the cost of *not* solving the problem. This would really be

concern, not fear, because now citizens would be facing a known, measured problem.

Instead of *uncertainty* about the status or magnitude of the problem, there would now be easily understandable numbers measuring how sustainable the planet is.

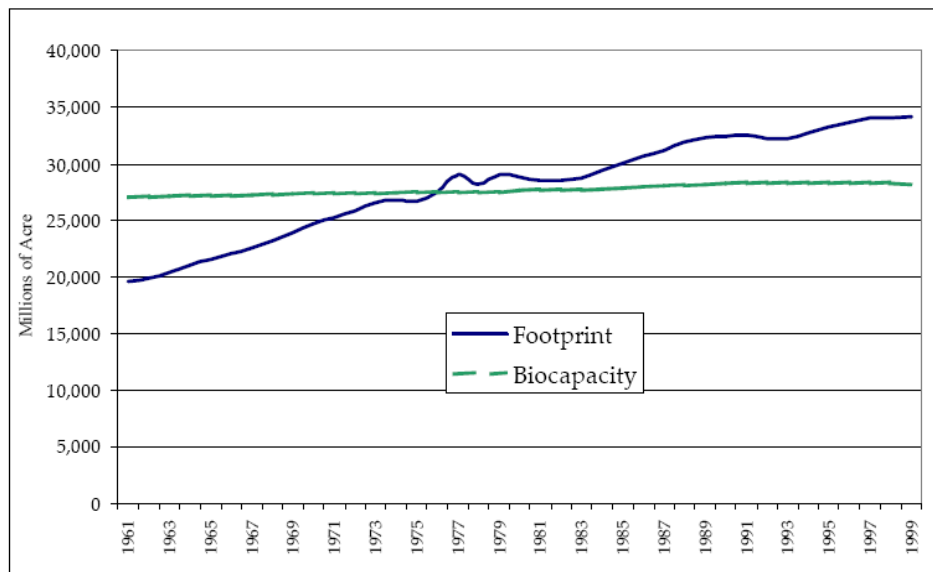
Finally, instead of *doubt* about the accuracy of data, there would now be a strong sense of trust that the Sustainability Index was as correct as is humanly possible. And, instead of *doubt* the problem needs solving now, there would be just the opposite: a strong national or global desire to solve the problem as soon as possible.

While no single measure of environmental sustainability is perfect, it is possible for a single number to accurately summarize how sustainable society is on a global basis. This single measure is called the Sustainability Index. It measures how much of the earth's carrying capacity is being used. If the index is over 100%, then it is unsustainable. Currently it is about 120%, as shown below.¹²

Here we have used the Ecological Footprint for the index, though any suitable index would do. The carrying capacity of the earth is approximated by the horizontal line. This line was crossed around 1980. It is not hard to visualize that if the footprint line is projected a few decades ahead, it will grow to such a high level of overshoot that catastrophic collapse is inevitable.

The index would include projected results. If society is doing nothing or too little to solve the problem, then people can immediately see that the

Humanity's Total Ecological Footprint



projected Sustainability Index is still not good enough.

The Sustainability Index would be as widely published as stock market indexes. Eventually, once a suitable data collection system was in place, it would be updated just as frequently, in real time. Regional, national, and local indexes would also be published and compared. Together these would serve as a constant reminder of the true state of affairs, a sort of giant thermometer of the environmental health of civilization.

How the Sustainability Index Works Dynamically

The purpose of the Sustainability Index is to provide an accurate, universally understandable measure of how well we are doing in solving the global environmental sustainability problem. Once the index is created, the **We Need to Be Sustainable** loop shown will appear.

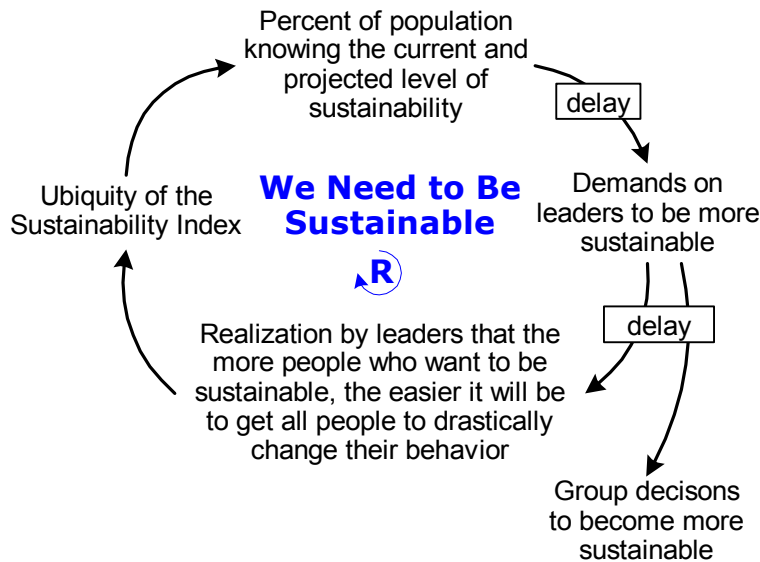
Actually many Sustainability Indexes or their equivalent already exist. Unfortunately they are not in the public's eye every day, mainly due to wrong priorities. Many are also not sufficiently mature or updated frequently enough. If the wrong priorities of the race to the bottom can be changed to the right priorities of the race to the top, high quality Sustainability Indexes will start springing up faster than cornstalks in the springtime.

Starting at the left node, the loop works like this: When the index starts to be widely published, the *Ubiquity of the Sustainability Index* goes up. This increases the *Percent of the population knowing the current and projected levels of sustainability*. Due to a *delay* little will change at first, because

it takes time for people to come to new conclusions. That is, it takes time for their sustainability memes (a meme is a mental belief) to grow in strength and number. But once those memes grow and reach a certain threshold of activation, people will increase their *Demands on leaders to be more sustainable*.

Once again, little will change at first, because it also takes time for leaders to come to their own new conclusions. Their sustainability memes must grow in strength and number too. They must also grow to a high enough quantity and strength to overcome the competing memes emanating from the New Dominant Life Form.

But eventually, after a *delay*, this will happen, causing an increase in *Realization by leaders that the more people who want to be sustainable, the easier it will be to get all people to drastically change their behavior*. One way to do that is to increase the *Ubiquity of the Sustainability Index*, and the loop starts over again.



The loop also affects a node outside the loop. As *Demands on leaders to be more sustainable* grows, so does *Group decisions to become more sustainable*. This is the real benefit of creating the loop.

As the loop grows, more and more citizens and leaders will be thinking **We Need to Be Sustainable**.

As the percentage of the population thinking this way becomes the majority and then a super majority, the desire to be sustainable will become an irresistible, unstoppable force that will lead to rapid solution of the problem. This will occur even if a large amount of self-sacrifice is necessary, because people will now see sustainability as the highest priority. They will see it this way because the alternative of not doing enough to solve it will be clearly shown by Sustainability Index projections as a certain road to disaster.

Summary and Conclusions

The six solution elements presented have been engineered to work closely together to change the general ability to detect political deception from low to high. These elements change the structure of the human system so that its new equilibrium is a state of high ability to detect deception. Once ability to detect deception goes high enough, the race to the bottom will collapse, causing the race to the top to become the dominant loop in politics. This in turn will lead to an intense global effort to solve the environmental sustainability problem.

Actually, these six solution elements are only part of the overall solution. Due to space limitations the solution presented here is incomplete. The full solution requires 23 solution elements divided into five packages. There are also more high leverage points than the single one used here. We have presented only the first package and the most important high leverage point here. This is probably sufficient to get the ball rolling in the right direction, but not fast enough. Nor is it a permanent solution. For the reasons why and the other solution elements, please see the manuscript.

However, please note that the manuscript is not that concerned with the exact solution. Instead, it focuses the bulk of its efforts on developing a problem solving path which, if taken, should quickly lead to an adequate solution. The manuscript emphasizes again and again that the solution presented is only a sample solution, and should not be interpreted as *the* solution. *This is because the fundamental reason for solution failure is the problem solving approach that most problem solvers have been using.* This is basically an ad hoc, common sense, event oriented approach. This works fine for everyday problems, but usually fails disastrously for difficult complex social system problems, such as the global environmental sustainability problem.

It is time for a final few words about that problem.

The political decision making process we use today was designed by the forces of evolutionary experimentation, one trial and error at a time. It is no more than a vast, ramshackle collection of historical precedent. Thus it is well designed to handle what it

has encountered in the past. But it is ill prepared to handle problems which differ radically from those of the past, such as global environmental sustainability.

As a result, just when we need it to be working at its best, the political system is working at its worst. In most countries, highly partisan conflict frames legislative debate. Behind the scenes the modern corporation and its allies control all the key agents participating in that debate. This causes decisions to favor the interests of the New Dominant Life Form over the interests of *Homo sapiens*. Consequently what should be the political system's top priority, solving the global environmental sustainability problem, is barely on its radar.

It is time we threw off the backward looking forces of evolution as the chief designer of the political decision making process, and replaced it with the forward looking forces of engineering.

This may look hopelessly naive and impossible. Where do we start? How do we do it?

Those questions will remain unanswered as long as problem solvers continue using an ad hoc, common sense, event oriented approaches. But if they switch to the same stunningly successful approach that science adopted in the 17th century—rationality, through the use of a process that when correctly applied guarantees results—they could answer these questions.

The answers might be much like the six tightly coupled solution elements presented in this brief article. Out of millions of possibilities, these six were converged upon by the persistent application of the System Improvement Process and the continuous improvement of that process as it was applied. *It is only the output of a rigorous, highly refined engineering process like this that has any hope of solving a problem that has reached the very edge of a precipice.*

If solution elements like these do solve the problem and a race to the top begins, a wave of fresh, clean air so pure and vitalizing will roll across the political landscape that after it passes, a new world no one has ever seen before will remain.

And it will remain a long time, because now it will be sustainable.

We, the Greater Gwinnett Group in Georgia, sincerely hope the message in these articles leads to deep self-examination, within the Sierra Club and the environmental movement.

One of our members, Jack Harich, has been engaged in a multi-year project to get to the heart of why society is so dead set on environmental self-destruction, and to demonstrate how analytical methods are a very attractive alternative to solving the problem. This article series summarizes his work in what we believe to be a very accessible manner, despite the underlying technical nature of the concepts.

Jack is a systems engineer in Atlanta, Georgia, US. In 2001, after 20 years of consulting for business and solving their problems, he noticed there was a much more important problem: global environmental sustainability. If it was not solved, then no other problem mattered, so he switched to that problem and made it his life's work.

Copies of this article series are being distributed to environmental leaders for discussion, feedback, and improvement before publication, hopefully in an environmental magazine with wide circulation. *Please do not publish your copy.* Suggestions and discussion of any kind are welcome. The author may be reached at jack@thwink.org or 404-296-5284. For discussion, please go to www.sierraclub.org/summitforum and we will see you there!



Many, many, many thanks to all the people who have helped make this alternative approach to a solution happen.

Endnotes

¹ The special series is at www.grist.org/news/maindish/2005/01/13/doe-intro. There *The Death of Environmentalism* essay can be found, along with other material, including Carl Pope's response. The original essay is at www.thebreakthrough.org/images/Death_of_Environmentalism.pdf.

² The long passage about Jay Forrester's experience on "The Beginning of System Dynamics" is from sysdyn.clexchange.org/sdep/papers/D-4165-1.pdf. This was a "Banquet Talk at the international meeting of the System Dynamics Society, in Stuttgart, Germany, July 13, 1989."

³ From a scientific viewpoint, *all solution attempts are actually experiments*. This attitude helps to keep problem solvers thinking in terms of always being somewhere in the process of the Scientific Method, as well as other related processes they may be following.

⁴ The paragraph on low leverage points is from *World Dynamics*, by Jay Forrester, 1971, page 95.

⁵ Please note that in the United States, opposition to environmental sustainability was strong long before the George W. Bush administration began in 2000. For example, in 1999, under a Democratic presidency, the US Senate rejected the Kyoto Protocol by a vote of 95 to zero. As another example, during Prep Com IV in New York City for the Rio Earth Summit of 1992, 139 nations voted for mandatory stabilization of greenhouse gases at 1990 levels by the year 2000. *Only the US delegation opposed achieving this goal*. The US then proceeded to use its muscle to strip these targets and compulsory aspects of the treaty away, in a deplorable series of behind-the-scenes arm twisting and deal-making efforts. This left only a weak shell to take to the final conference in Rio. *Thus the current US administration is merely a stronger opponent than usual*.

Also note that the US is not the only country opposing environmental sustainability. But it is the strongest one, and it often uses its power and influence to steer other countries to support its position. Why is this? Probably because the New Dominant Life Form is strongest in the United States.

⁶ On www.nrdc.org/about/ the Natural Resources Defense Council writes that, "We are confident we will continue to make progress, for even in this *harsh political climate*, we have seen signs of hope."

In their 2003 Annual Report at www.ucsusa.org/ucs/about/index.cfm the Union of Concerned Scientists wrote, "We are confident he [Kevin Knobloch, their new President] is the person best able to lead the organization in what is, without question, *the most hostile environment in which we have ever struggled to advance our goals*."

⁷ The table of the world's 100 largest economies is from *Global Inc.: An Atlas of the Multinational Corporations*, 2003, by Gabel and Bruner.

⁸ The definition of vision is from *Webster's Encyclopedic Unabridged Dictionary*, 1989, page 1597.

⁹ The most interesting account of the complete problematique I've seen is at www.cwaltd.com/pdf/clubrome.pdf.

¹⁰ The image is from tsa.ucsf.edu/~snlrc/encyclopedia_romana/greece/hetairai/diogenes.html.

¹¹ Source of testimony on corporate bond ratings: hsgac.senate.gov/032002lieberman.htm.

¹² Source of Ecological Footprint graph: www.rprogress.org/newpubs/2004/footprintnations2004.pdf. The graph is also in the third edition of *Limits to Growth*, 2004, which is where I first encountered it.
