Chapter 1

Diagnosing a Critical Condition

Why is so much going wrong everywhere at once?

The answer is simple, though its implications for us are anything but. We humans are facing what has been variously described as collapse, bottleneck, overshoot, catastrophe, the long emergency and Nature's revenge because we are breaking Life's paramount rule:

We are living beyond Earth's means.

Our activities are bankrupting Earth's four-billion-year-old living trust accounts as surely as they are bankrupting most of the Earth's national treasuries.[1] In 2005, the United Nations' Millennium Ecosystem Assessment put our hazardous extravagance in more official terms: "Human actions are depleting the Earth's natural capital, putting such strain on the environment that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted."[2] Our actions have depleted even more of that natural capital in the intervening years.

Economic, environmental, social and political challenges are the direct and indirect consequences of living beyond Earth's means. And they are neither static nor separate and distinct. On the contrary, they

are reinforcing, amplifying and complicating each other and converging in a way that is precipitating a mega-crisis for which we modern humans have no precedent.

- Never in the historic period, going back more than 6,000 years to the first city-states and civilizations, have all of Earth's human communities faced — simultaneously — the real and present danger of being unable to meet most of their people's needs.
- Not since the end of the last ice age 11,000 years ago has the health and continuity of all the living systems on Earth been put at risk by a single global phenomenon.
- Not since archaic bacteria approached the point of exceeding Earth's capacity to support them has a single species been the cause of that Life- and life-threatening phenomenon.

It's not surprising, then, that most of us haven't seen this moment coming and don't yet appreciate the gravity of our circumstances or understand them fully if at all. Not surprising either that most of us, despite our being members of Earth's predominant species, don't yet accept responsibility for the part we're playing in this unfolding tragedy. It's easier, happier — and characteristically human — to deny the seriousness of the fix we're in than to face what it would take to fix it.

Bankrupt governments? Nothing new, we'll find a way out. The end of affordable oil? Not for decades, the skeptics say. Expensive coal, peak natural gas and the ramifications of losing *all* of our cheap fossil sources of energy? Won't happen for centuries, say the no-limits faithful. Global warming, climate change? Fewer than half of us — 26% of Britons, 42% of Germans and barely 50% of people in the US, for example — believe that significant warming or instability is occurring or that we have much to do with it if it is.[3]

Not believing in something doesn't prevent it from happening.

How about Amazon rainforest collapse, warfare over oil and gas in an often open Arctic Sea? Can we imagine Walmart closing, two billion of us homeless and five billion hungry? What if social security systems, insurers and emergency management agencies go bankrupt? How about

hundred-year droughts in some places and thousand-year flood cycles in others?

Self-styled realists assure us that these are not logical extensions of what's going wrong in the world already. But what if the realists are wrong? In truth, these scenarios are fantastical. But they are also logical extensions of what's already going wrong in the world, if we don't do something effective about it.

"The world is on a journey to an unstable destination, through unfamiliar territory, on an uneven road and, critically, having already used its spare tire."[4]

And who is we? In these pages we who will experience this convergence of crises is all of us: humankind. Young, old, rich, poor, male, female — all of us everywhere will suffer a failure to fix what's going wrong everywhere at once. But obviously not all of us are responsible for this mega-crisis. The young and poor and less able in present and past generations have born the brunt of symptoms but do not bear the burden of responsibility. And the deceased cannot help us now except by their wisdom and example. But for reasons that will become clear in the pages ahead, we adult, able humans are all complicit — wittingly or unwittingly, willingly or unwillingly, directly or indirectly — in the creation of Earth's critical condition. Consequently, we adult, able humans are the ones who can do something about it, who can get past denial and create the cure for and alternatives to this critical condition.

But even if we do get past denial of the seriousness of our present circumstances and of worse ones if we don't do something effective, how can we possibly get our minds around a challenge this enormous for which we've had no preparation?

Over 40 years ago media analyst and futurist Marshall McLuhan foresaw this clash of the human mind with too much reality. "When faced with a totally new situation, we tend always to attach ourselves to the objects, to the flavor of the most recent past. We look at the present through a rear-view mirror. We march backwards into the future."[5] In other words, we do more of the same things that brought us to the brink of catastrophe until the catastrophe itself requires us to do something different.

Ignorance and inexperience explain our plight, but they are not permanent conditions and do not require us to capitulate.

The good news, and there is some, is that we adult, able humans are entirely capable of understanding why we are in crisis and of learning how to effectively deal with it.[6] Down through the millennia, when push has come to shove, when there was finally no choice, humans have learned how to work together to survive ice ages and meltdowns, volcanic winters and collapsing civilizations, decades-long droughts, depressions and other disasters. As soft as some of us have become, as exhausted as others of us already are by long years or whole lives of hardship, we are the descendants of those survivors. We can learn how to survive this mega-crisis, too. And we can surely make the process of trying to survive as humane, compassionate and rewarding as we are able. Some portion of us always has.

One way to begin is to acknowledge the fact of the crisis by giving it a name. Giving something unfamiliar an effective name can be the beginning of the end of ignorance — and fear — of it.

What's in a Name?

We need an evocative, even provocative name for our present mega-crisis so that it gets at least the same level of attention, widespread recognition, support and devotion we give top athletes, pop singers and movie stars.

We have most definitely arrived at or, as Bill McKibben suggests in his newest book with its aptly misspelled title, *Eaarth*,[7] we may have just passed the *tipping point* in the evolution of this crisis after which nothing will be the same. The tippers are anticipated to be the end of cheap oil, an uncongenial climate, a fragile global economy and/or the apocalyptic convergence of all three. But, though McKibben and others believe we've shot past the tipping point already, there is not yet widespread agreement that we have. Most people cling to the belief, or the hope, that if there is to be a tipping point, it's still up in front of us somewhere moving away from, not toward, us.

Collapse is the most commonly used term for what's wrong in the world. It's meant to name what comes after the tipping point: the decline and fall of modern industrial civilization. But as I write, collapse is still a prediction. It properly names what will come, and possibly quite soon, if we do not effectively and immediately face up to the real potential for worldwide system failure.

Tipping point?
Collapse?
Critical Mass!

In fact, we have been able to use "collapse" to describe the demise of earlier socio-economic systems and civilizations only long after it was clear they had collapsed. It took the Roman Empire several centuries to complete the process we now call its "fall." Decline was an on-again-off-again affair involving many of the same kinds of challenges we face now except that they took place regionally rather than globally.

It seems to me that *Critical Mass* better suggests the full significance and weight of the collection of crises we are already experiencing. The term critical mass in itself has no positive or negative connotation. Originally used by nuclear physicists to name the amount of fissionable material required to trigger and sustain a chain reaction, it is now used more generally to identify a point in time or in a process when enough of something has been literally amassed that a spontaneous transformation occurs. After critical mass is reached, something new emerges or is created, or a new state of being is achieved.

And unlike the other possible names, Critical Mass can serve a double purpose: It can be used to name not only the crisis but also its cure. Getting through this mega-crisis in a way that doesn't make the Dark Ages look good will require that critical masses of us get our minds around its nature and cause and then deal with that cause.

The something new that follows on the heels of reaching critical mass may by our reckoning be good. Members of the activist cyclists' group Critical Mass deem it good when enough of them gather in a city's streets to stop traffic, making their point about the dark side of our dependence on fossil-fueled transportation and hopefully helping to inspire a widespread transformation to post-carbon (non-fossil fuel) forms of transportation, like cycling.

"I believe that we face a dire and unprecedented period of difficulty in the twenty-first century, but that humankind will survive and continue into the future — though not without taking some severe losses in the meantime, in population, in life expectancies, in standards of living, in retention of knowledge and technology, and in decent behavior."[8]

On the other hand, what comes after critical mass may be something that is by our reckoning disastrous and regrettable, as when plague amasses in so many humans' bodies that it takes the lives of whole communities or when the amount of fissionable material gathered is sufficient to set off a chain reaction in a nuclear weapon.

If it is not dealt with soon and effectively, this critical mass of crises we are facing now will be of the latter sort. It will be *so* disastrous and regrettable from the human perspective that in these pages I will distinguish it from the positive and lesser kinds of critical mass with capital letters in order for us to be constantly reminded how urgent it is that we understand and deal with it.

So, there's a second answer to the question "Why is so much going wrong everywhere at once?"

We have reached global Critical Mass.

The next step, now that we've got a name for our mega-crisis, is to get our minds around what Critical Mass is and what it's doing to us and our world. We'll do that in this chapter and the next. The second step will be to determine what's causing Critical Mass. *How* are we living beyond Earth's means? That's the subject of the remainder of Part I. Part II offers what I believe is a compelling, perhaps inarguable, context for understanding what it would take to mitigate and get beyond Critical Mass. And Part III explores how we might actually do that.

An emotional roadmap to this book would warn you that Part I is pretty bleak and negative. But rest assured. Part II is inspiring and eye-opening, and Part III is downright optimistic. May our future, starting now, work that way, too!

Understanding Critical Mass

In his 2007 bestseller *Blessed Unrest,* Paul Hawken observed that one of the reasons most of us have not yet grasped the severity and complexity of the Critical Mass of crises we're facing is that we haven't had anything to compare it to. Referring to the "Gaia hypothesis," (Sir James Lovelock's seminal insight that Life on Earth works in ways that are similar to the way any living organism works) Hawken wrote: "If we accept that the metaphor of an organism can be applied to humankind

[too], we can imagine a collective movement that would protect, repair, and restore that [planetary] organism's capacity to endure when threatened," as it presently is. Hawken proposes that such a movement — of individuals working through non-governmental organizations — would "function like an immune system" and the individuals and organizations in the movement could be thought of as antibodies.[9]

That's it! I thought. *A threatened immune system, antibodies* ... That's why we're exceeding Earth's capacity to support Life as we know it.

Critical Mass is the Earth's equivalent of AIDS.

This insight became more compelling the longer I considered it.

Just as the diverse parts of the immune system are scattered throughout our bodies, Earth's diverse natural communities and ecosystems have in the past worked together to provide the same sort of protective, defensive and healing services for Life as a whole that our immune systems provide for us. That's what James Lovelock and others have meant when they've said that Life learned how to create and maintain the conditions in which it can continue to exist on Earth despite challenges like ice ages and asteroid collisions. Life evolved its own version of an immune system. And our activities are threatening to undermine it.

But, if we're the ones who are compromising Earth's immune system, why haven't we hit global Critical Mass sooner?

For the past 30,000 to 40,000 years, whenever humans arrived on a new continent, we've killed and eaten enough of the largest, slowest mammals we found there to render them extinct within a few thousand years. Their disappearance changed the makeup of ecosystems everywhere we went to the extent that the phenomenon has a name: the Pleistocene Overkill. But mega-fauna (large animal) overkill was the only widespread destruction we were capable of back then, and it happened one region and continent at a time over thousands of years. And after we'd wiped out the mega-fauna, we settled into our new locations. New ecosystems arose around us and settled in, too. We wreaked very little additional havoc until the first civilizations arose around 6,000 years ago. Most indigenous (native) peoples continued to adapt their ways of living to the requirements of their natural surroundings until quite recently. The lives and lifeways of very few

indigenous peoples remain unaffected by the global economy, its products and demands.

Civilizations, on the other hand, have always compromised the health and the healing functions of natural and human communities that were within their reach. They have always induced *regional* Critical Mass. But for most of the historic period, the larger planetary immune system (the majority of natural communities and ecosystems, which no civilization had yet compromised) was still intact and functioning. Compromised regional ecosystems eventually recovered, and new ones, adapted to civilizations' trespasses, arose. New, smaller-scale, less excessive human communities developed with them after the offending civilizations collapsed, and for a while these smaller communities lived within Earth's means.

We have only been technologically sophisticated enough to exceed the whole Earth's capacity to support us and to undermine the function of *all* of Earth's natural and human communities — the whole planet's immune system — for the past 100, fossil-fueled, globally industrialized years. And that's just what we've done.

Put simply, then, Critical Mass is attacking Earth's immune system (the methods Life has evolved over four billion years to protect and heal itself) in the same way that AIDS attacks the human immune system (the methods Life evolved over several million years to protect and heal our bodies).

Critical Mass poses the same risk to human survival and Life as we know it that AIDS poses to the lives of the people it infects. If it is allowed to run its course, Critical Mass will lead to a protracted and profoundly unpleasant demise for all but the hardiest, most adaptable forms of life. Life will last, but many of us and other living things won't.

> "Let us hope that we will not have to wait for a catastrophe that kills hundreds of thousands or millions before a critical mass in society develops the solidarity and the will to face the problems that confront all of us.... Ours is not a time for despair; it is a time for action. Not short-term remedial action, but action aimed at bringing about fundamental transformation."[10]

Briefly reviewing how the AIDS crisis has unfolded will help us understand how the Earth's equivalent mega-crisis is

presently unfolding and why mitigating and curing Critical Mass must also become our common cause.

A Brief History of HIV/AIDS and Its Pathology

In the late 1970s, doctors in offices, clinics and hospitals in places as far apart from each other geographically, economically and culturally as the United States, Haiti, Sweden and Central Africa were faced with a mystery. Significant numbers of young men were developing symptoms of infection and disease that ranged from respiratory ailments, lymphomas, blood disorders, anemia and herpes to skin lesions, cancers, fungal and bacterial infections, meningitis, paralyses and tuberculosis.

Despite their caregivers' attempts to mitigate symptoms and treat the diagnosed conditions, and allowing for successes that were often as poorly understood as failures, surprising numbers of the young men on every continent the disease had reached, many of them gay or drug addicts, died. In the course of things, women, children and also men who'd had no homosexual contact or history of street drug addiction were afflicted with the same odd assortment of apparently random illnesses. They too became ill and died. Though some patients were ravaged by multiple illnesses, one after another or several simultaneously, pneumonia was often the immediate cause of death.

Survivors of the first opportunistic infections gradually lost resilience and vigor. After a number of years they became vulnerable to relapse and unusually susceptible to a host of additional infections. And eventually even minor maladies, like the common cold, yeast infections and cat scratches could prove life threatening. No conventional diagnoses untangled the snarl of symptoms. No conventional protocols effectively treated them.

In 1981 "a number of theories were developed about the possible cause of these opportunistic infections and cancers. Early theories included infection with cytomegalovirus, the use of [recreational drugs called] 'poppers,' and 'immune overload.'... Knowledge about the disease was changing so quickly that certain assumptions made at this time were shown to be unfounded just months later."[11]

By 1980 this medical mystery occupied the minds and seriously frustrated the staffs of health care establishments on five continents: North America, South America, Europe, Australia and Africa, where the virus was presumed to have originated. By the mid 1980s, cases of the disease had emerged in port cities along the coast of China. Medical practitioners and researchers in institutes, hospitals and national health organizations around the world had begun by then to compare notes. And by 1982 a few threads were untangled from the snarl.

The mystery condition was not a random collection of unusually potent single diseases. It was a syndrome. The wildly diverse illnesses were neither discrete nor unrelated. Nor was any one of them the primary cause of death. Rather they were mutually reinforcing manifestations of a single highly contagious disease with a single unifying pathology: immune system failure. Every one of the patients had a seriously compromised immune system. Their bodies were not resisting or fighting off infections or preventing their recurrence. Each kind of infection was taking full advantage of these patients' weakened, unprotected condition.

What was more disheartening for both patients and caregivers was that each new or recurrent infection amplified others, competed with them for medical attention or even interfered with or counteracted their treatment. The syndrome's particulars varied from patient to patient, but they apparently shared a common source and produced the same results: debilitation and death due to the body's utter defenselessness.

The implication was clear: Relieving symptoms would continue to be important to a patient's overall health and well-being. But treating the diverse illnesses and infections that constituted the syndrome without at the same time addressing its cause — whatever it was that was disabling and shutting down patients' immune systems — could only buy patients time. It would not prevent inevitable disabling and probable death. And it would not prevent the spread of the disease. Millions, perhaps hundreds of millions of lives were at risk. No population and no place in the world would be safe so long as the underlying cause of immune system failure was unknown.

A decade after the first patients showed up in emergency rooms and clinics, and after several trial balloon names proved misleading,

researchers were able to give the new disease a scientifically accurate name: acquired immune deficiency syndrome. The acronym — AIDS — stuck so well in people's minds that within months AIDS was recognized as a medical, social, economic and political priority at the local, national and international levels. The dots between diverse symptoms and illnesses were finally getting connected. Money, research, education, potential treatments, protocols, drug trials, organizations, celebrities and changed behaviors gathered around AIDS as around no other global crisis in recent memory.

Emergence of a Critical Planetary Condition

AIDS threatens the lives of perhaps sixty million humans. By contrast, if mistreated or left untreated, the global pandemic I'm calling Critical Mass threatens Life as we know it and all of our lives now and for generations to come. So let's track the startling and instructive number of similarities there are between the AIDS crisis and this unimaginably worse one.

Warnings of a potential worldwide convergence of environmental, economic, social and political crises were issued as early as the 1930s by visionaries in many fields. However, symptoms only began to intensify enough to get attention in the major media on a regular basis in the 1970s.

The earliest symptoms of global Critical Mass ranged from increasing numbers of endangered species, the outsourcing of prosperous nation manufacturing jobs to poor nations' sweatshops, local and regional financial crises, dead lakes, polluted air and rivers, the loss of family farms and poorly protected toxic and hazardous waste sites, to increasing

> "It is argued that biological immune systems share a number of similarities with ecological economic systems in terms of function. The similarities include the ability to recognize harmful invasions, design measures to control these invasions and destroy the invaders, and remember successful response strategies. Studying the similarities ... between immune systems and ecological systems can provide new in-sight on ecosystem management."[12]

numbers of oppressive dictatorships, energy shortages, persistent famines, intensifying ideological, religious and territorial conflicts and widespread corporate environmental and civic irresponsibility.

None of these crises seemed on its own catastrophic. Just as some people seemed to be more likely than others to succumb to the infections that characterize AIDS because their bodies had already been weakened — by chronic illness or malnutrition, for example — some places were more likely to succumb to the afflictions that characterize Critical Mass. People in parts of the world — particularly south of the equator — that had long been designated as The Third, undeveloped or developing world, experienced the most symptoms and suffered them hardest. Like gay men and drug addicts, they were widely if inaccurately assumed to be responsible for their own suffering. Though it behooved the prosperous nations to assist the poorer nations — in order to keep a majority of them afloat and their resources cheap and available, as well as for altruistic reasons — the poor lived worlds away. Their problems were, finally, their problems.

By the 1980s, the symptoms of Critical Mass were recognized to be spreading and dangerous, to be not worlds away but worldwide, largely because that's when prosperous countries began to experience the same symptoms that poorer countries had experienced for decades such as failing ecosystems, crumbling infrastructure, disappearing species, unmanageable immigration, health-threatening pollution, homelessness, government ineptitude and a widening gap between the richest and poorest.

Like the earliest presenting symptoms of AIDS, newly universal problems were in the late 20th century still deemed to be temporary, relatively minor or to belong in separate and distinct categories: environmental, economic, social or political. Experts, leaders, managers, agencies and institutions charged with monitoring problems in each of these separate categories were the ones ultimately responsible for fixing whatever was broken. The rest of us could go about our business.

The enormity and coherence of the threat that the sum of the problems posed, the fact that they constituted a single syndrome with a single underlying cause, was not understood. With the exception of a few original thinkers — scientists, journalists, futurists and social critics

who were frustrated by their inability to attract attention and criticized for their gloomy prophecies — most of us missed the fact that problems were not just adding up but multiplying exponentially and would affect the rest of us sooner or later.

Crisis Multiplication in Complex Systems

As is the case in an HIV-infected body, on an Earth beset with the equivalent of HIV/AIDS, the particular problem or set of problems at which we're looking at any point in time trails others behind it like the clouds of sand and dust that followed tractors plowing the overworked soils of Texas and Oklahoma in the US Dust Bowl of the 1930s and that follow the plows and vast herds of sheep across the plains of western China today. On a living planet there is no such thing as a single problem or a simple fix. And the problems we're facing can no more be organized into neat categories and solved separately than those dust clouds can be made to settle down to be swept into tidily separate piles.

A person infected with HIV may at first experience fairly minor symptoms like oral thrush, a persistent cold, numbness or tingling in the extremities, headaches or a minor skin rash. But that's never all, or the worst, that's going on in that person's body. In chillingly similar fashion, Critical Mass may appear first as a manageable environmental problem like drought, but closer inspection reveals that the seemingly solo and solvable problem has created two others — say, farm foreclosures and dried up wells — that create or merge with even more problems, like farming-related business closings, water rationing that affects manufacturing, factories laying off workers, employees unable to pay their bills, plagues of locusts and lifeless soils. In short order the first problem is dragging a dozen others behind it. While they multiply, each of the problems also amplifies and is amplified by one or more of the others, just as bronchitis amplifies a cold and is amplified by pneumonia in its turn.

This is the way both HIV/AIDS and Critical Mass work. One times two doesn't equal the tidy two our minds and simple math know well. With these two diseases — as with all complex systems from bacteria to brains to the biosphere, and from neighborhoods to nations — one times two equals something closer to twelve.

Why?

Because it is the nature of complex systems that every thing or participant in the system is connected directly or indirectly to every other thing or participant, and therefore each thing or participant is capable of influencing or being influenced by the others. The original Greek word for system means to set up or establish something *along with* one or more other things. The point is that nothing in a complex system comes or goes, shrinks or grows without affecting something else or in some cases everything else in the system.

System: A group of interacting, interrelated and/or interdependent elements forming a complex whole.[13]

There are non-living complex systems like governments, corporations, factories, public utilities, cities, air traffic control programs and economies; we organize and manage them, more or less ably, to serve our purposes. The longer they exist, the more likely it is that even such non-living systems acquire some of the spontaneous characteristics of living systems and something like lives and minds of their own. But they are still products of our imaginations, systems we've designed and created. We have some degree of control over them (for instance, over whether they persist or we "kill" them) and some degree of understanding about how they work.

On the other hand, complex living systems — natural systems — organize and manage themselves. When humans try to reorganize or manage natural systems without knowing much about how they work, as we've been doing for several millennia, we throw off carefully evolved internal processes. We cause changes that ripple through the natural systems and then come back to us again in ways we didn't anticipate and aren't ready for.

Humans get wrong-footed by unanticipated crises in natural systems because we've lost sight of the fact that the non-living systems we've created and the natural ones we didn't create share the same planet. We are all part of the same larger system — Life — which is part of the largest system that's of immediate concern to us: Earth. And on Earth, Life rules, we don't. Why? Because, though complex systems that we create effect how life works, our systems exist within and ultimately depend on Life, not the other way around.

This is an inarguable, inescapable fact, one we simply must internalize. **Life rules. We don't.**

The upshot of this is that crises within non-living systems affect not only other non-living systems but also all the living systems with which they share this planet. And crises that occur in living systems, whether they are human-made or natural, affect non-living systems like the ones we've created.

For example: British Petroleum's (BP's) unprecedented Gulf of Mexico oil rig leak damaged the Gulf's marine and coastal ecosystems and they in turn damaged coastal communities' economies, BP's continued existence, political careers and perhaps the regulation of further deep-water oil drilling necessary to keep affordable fossil fuels flowing into and through the already vulnerable US economy.

In complexes of complex systems, the feedback loops are without end, the crises multiply endlessly and sometimes exponentially. That's what we're experiencing now with the convergence, multiplication and interaction of economic, environmental, social and political crises in the syndrome I call Critical Mass.