



THE PHOTOGRAPHER'S FRAME

# A Solution to Existential Climate Crisis—RTFM\*

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**\* Read The F'ing Manual!**

## ▶ THE CHALLENGE

The first step to resolving humanity’s greatest existential threat, the current climate breakdown, may be as simple as “read Earth’s operating manual.”

**So, let’s do it.**

We can learn everything we need to know to sustain life and thrive on this planet by understanding the best-preserved remnants of nature in national parks, sanctuaries, refuges, and allied protected reserves on land and in the sea. If we learn to understand unimpaired nature, we can better diagnose complex environmental health issues, test effective remedial treatments, and apply the best modalities to sustain life, including our own, and thrive on Earth.



The Royal Edinburgh Military Tattoo annually displays human diversity.



A “rose” made of galaxies.  
NASA, ESA, AND THE HUBBLE HERITAGE TEAM (STSCI/AURA)

## ▶ HERE’S THE SITUATION

We’re on a ship with eight billion other souls and millions of other species hurtling through space at 30 kilometers per second. We discover that our ship’s life-support system is failing. Yet none of us can fully perceive these undeniable facts of our predicament. A catastrophe looms.



**Warnings of future tragedy abound** in the manner of the biblical four horsemen of the apocalypse. Global news is dominated daily by the consequences of climate-driven droughts, floods, storms, and fires, implicating humanity as a fifth horseman. Landscape-altering floods in California’s Death Valley National Park, one of Earth’s driest and hottest regions, now occur so often that park roads and facilities are barely repaired or replaced before the next flood materializes out of the clouds driven by intense haboobs.



**Climate-driven forces warm the ocean**, reducing its productivity, and often collapsing fisheries until a point is reached where local fleets become more valuable as tourist attractions than as working boats. Famine and pandemic pestilence threaten human survival. Financial, real estate, and insurance markets stagger in the face of the rising sea levels, diminished urban water supplies, and destructive storms of all kinds.



**Humanity is driving nature toward an apocalypse** borne by unsustainable circumstances. Across the US, as humans supplanted lightning strikes as principal ignition sources, wildfires unnaturally increased in frequency and intensity. Fire season duration subsequently increased, exacerbating the effects of warmer, drier climates. Catastrophic fires have become common, making a recovery to initial conditions impossible. For example, the massive 2021 KNP Complex Fire appears to have converted 30% of the mature forests of California's Sierra Range to chaparral scrublands. One hundred human generations can come and go in the lifetime of a giant sequoia. Sequoia groves have occupied the west slopes of the Sierra Nevada for millions of years, and nearly 20% of this unique ecosystem was lost in two years with 16 unprecedented, intense wildfires. For various socio-economic reasons, following 2017's Thomas Fire in affluent southern California's Santa Barbara and Ventura Counties, fewer than half of the 700 homes lost have been rebuilt, even after five years. Over the past 35 years, annual wildfire seasons around the globe have increased in duration by about a month. How much longer can such conditions continue to change at these rates without devastating human well-being?



**Ocean shorelines have become battlegrounds.** Increased storm frequency and intensities have battered low-lying coastal landscapes made vulnerable by rising sea levels. Natural coastal barriers, such as coral reefs, mangrove forests, and wetlands like Florida's famous Everglades River of Grass, now greatly diminished, no longer protect the world's fabled shorelines from storm surges, erosion, and saltwater intrusion. The once-thriving real estate and insurance markets that benefited from nature's gratis storm buffers and freshwater sources struggle to thrive and increasingly must seek government subsidies. Elevated ocean temperatures have decreased the nutritional value of algae at the base of the ocean food chain, disrupted food webs (including those with humans at the apex), and altered species distributions, all of which contribute to lower and less sustainable ocean productivity.



**Rapid climatic change** drives species into new geographic ranges, especially in arid landscapes where rivers and groundwater control life. Joshua trees are becoming rarer in their eponymous national park as the giant yucca forest migrates northward. Altered precipitation patterns cause extraordinary droughts and floods, compromising flow in major rivers, such as North America's Colorado, Missouri, and Mississippi, threatening hydroelectric power generation, food production, navigation, and urban water supplies. California's Central Valley groundwater supplies have subsided for decades due to increased agricultural irrigation withdrawals and reduced rainfall and mountain runoff. Such water losses disrupt the region's heretofore massive food production and foreshadow major interruptions in world subsistence.



**The prognosis reveals dire circumstances for humanity,** but how bad is it? Although the arid lands west of North America's 100th meridian enchant many people, their harsh environmental reality today is hostile to most life, which portends a perilous future for a much broader region. The challenge to humanity is to encourage hope, share existing knowledge, and engage nations in crafting strategic responses to the changing climate and its consequences. The extraordinary value of keeping nature intact to sustain the planet's life-support system must be recognized soon or the cost to future societies will become unaffordable. As a result, the most likely alternative outcome will produce increasingly hostile, chaotic, and untenable human environments in which the four horsemen and their allies are allowed to reign supreme.



**How can humanity correct course and avoid disaster?** Our heroic spaceship pilots, i.e., society’s leaders, are informed but remain skeptical; after all, they believe our ship is “unsinkable,” like RMS Titanic. Even as nature’s productivity and resilience faded unnoticed and ignored, many erstwhile leaders falsely claimed success by maintaining a misperceived status quo. We know from nature that we can’t turn back time for a Mulligan; we must continue this journey from our current position.



**Before South Florida’s real estate development**, the Everglades held back sea water, provided reliable rainfall, produced abundant food and wildlife, and sheltered people for millennia. Now governments spend billions in public revenue trying to restore the ecological services that nature once freely provided. At the same time, ordinary people suffer excessive sorrow for the personal losses of homes, livelihoods, and loved ones. In ancient Greek tragedy, heroes meet their downfall when they succumb to hubris, an arrogant belief in their infallibility. Jealous gods respond with a punishing lesson in humility. Today’s world stage is filled with elected leaders and autocrats who stand in as modern “heroes.” Unfortunately, to keep people distracted from real problems—and the difficult steps needed for real solutions—they still employ ancient techniques developed in human hunter-gatherer societies a million years ago by spreading fear, anger, and threats of pain and suffering from impending doom. How can modern leaders avoid hubris and humiliation?



**We enjoy a choice of futures** as many destinies loom before us. To choose wisely, we need the means to evaluate various alternatives and select feasible solutions. We must continue to learn how our ship's life-support system functions, discover the controls, and test courses of action. Areas designated to protect nature are like an owner's manual for the biosphere, i.e., the Earth's life-support system. Unfortunately, more of us should be reading that manual.



**Ecosystems manifest vital signs**, like other living systems. To assure client health and effective treatment of diseases and trauma, medical professionals (and their patients) benefit from having reliable measures of condition and performance based on extensive knowledge of human health and physiology. Similarly, understanding an ecosystem’s vital signs and how the system operates is critical to improving its performance, fixing it when it’s broken, and realizing its multiple values and costs. Such system knowledge also prevents losses and helps to mitigate damages. Knowledge and understanding produce better, faster, and cheaper solutions to climate breakdown challenges.



**We have hope and the means to act on what we know.** Earth's climate is a complex, dynamic system. Weather patterns and atmospheric conditions limit and strongly influence life's necessities, including oxygen, water, food, and shelter. Protected areas of nature that remain relatively unimpaired can serve as benchmarks for understanding Earth's life-support system and provide opportunities for people to obtain personal experiences with nature's power and possibilities; they represent, in essence, physical manifestations of the planet's operating manual.



**Protected natural areas are humanity's last best places** to learn how to survive and thrive on Earth. More than 80% of the glaciers in Montana's Glacier National Park have already melted away, yet visitors at a bus stop on Going-to-the-Sun Highway can still view one of the park's last 25 glaciers. Beyond the conservation, recreation, and inspirational values, protected areas of untrammled nature can show humanity how to:

- Determine past climatic patterns and their consequences for life;
- Provide early warnings of dangerous conditions that threaten survival;
- Identify current status of, trends in, and threats to Earth's life-support system;
- Define achievable goals to remediate Earth's degraded health and capacity to support humans;
- Differentiate the causes from the effects of biosphere dysfunction to guide remedial actions; and
- Understand the planet's life-support system components, including their form, function, and mutual interactions.



**Now is the time to act** so humanity may avert climate catastrophe. By assuring Nature’s integrity, diversity, and capacity for self-renewal in the remaining unimpaired fragments of the biosphere, these places can reveal how to diagnose, treat, and rehabilitate Earth’s life-support system. However, such reference sites must be selected judiciously. For example, the remnants of nature on New York’s 23-square-mile Manhattan Island (14,720 acres, population 1.63 million), even with its magnificent Central Park, have little to offer as a model of Earth’s biosphere. In comparison, the similarly-sized Virgin Islands National Park (14,950 acres, population 4,200), which protects nature on the island of St. John in the US Virgin Islands, is an effective bellwether indicator of environmental health, reflecting and revealing global trends in tropical ocean and island environments.



**Exceptional unimpaired places** will manifest the planet’s operating manual once they are identified and adequately protected. By adhering to this virtual planetary operating manual and acting accordingly, we can repair damage caused by the altered climate forces we have unleashed and create a sustainable human habitat. International calls for an initiative to set aside 30% of the globe as protected by 2030, called “Thirty-by-Thirty,” have gained political traction. In 2021, over 100 countries, including the G-7 and European Union, agreed to its tenets with \$5B funding for the Protecting Our Planet Challenge, and it became US policy. In December 2022 the Conference of the Parties of the Convention on Biological Diversity (COP15) formalized 30x30 on an international scale. The US 30x30 Initiative seeks to conserve at least 30% of US land and water to reverse the negative impacts of climate change and biodiversity decline. These efforts aim to protect more natural areas and increase access to nature for human communities.



**A hopeful and logical beginning**, like establishing the world’s first national park (Yellowstone, above), identifying the current situation, and acknowledging potential responses, are good. COP15 has identified the global challenges, and 196 nations have signaled their intentions.

Nevertheless, more urgency is required. People must still learn to “read the manual.” Only by studying nature in these unique places will this new knowledge guide humanity quickly enough to discover a better, affordable haven from an existential crisis.



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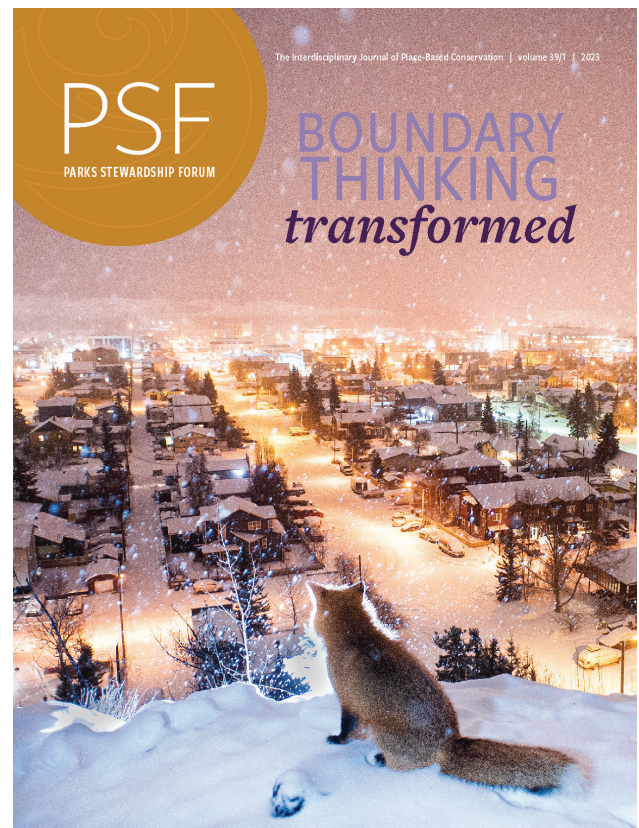
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**On the cover of this issue**

A red fox on the clay cliffs above the city of Whitehorse, Yukon Territory.  
**PETER MATHER**