

# **The Central Problem of Our Time:**

**Cumulative impacts of the  
human economy are destroying  
the Earth as a place suitable for  
human life.**

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**Hello – My name is Peter  
Montague**

**I'm a journalist,  
teacher and activist  
who's been writing  
about the  
environment for  
35 years.**

**Let's get right to it:**

**Part 1**

**The Predicament We  
Find Ourselves in**

# **Humans are causing 3 big problems:**

- 1) Changing the oceans and the atmosphere**
- 2) Contaminating the entire planet with industrial chemicals**
- 3) Causing a mass extinction of animals**

# **Ocean problem #1: The oceans are becoming more acidic:**

- **As a result, many creatures are unable to create, or keep, the calcium shell they need to survive.**

- **As the oceans become more acid, we are disrupting the entire oceanic food chain.**
- **Humans get 20% of their protein from the oceans.**

**The well-known biologist, Dr. Thomas Lovejoy, says ocean acidity is...**

**“The most profound environmental change I've encountered in my professional career.”**

**Dr. Lovejoy says the effects of acidity on ocean life are...**

**“...shaking the biological underpinnings of civilization.”**

# **A second major ocean problem: corals are dying**

- **30% of world's corals are dead or dying**
- **Global warming is speeding up this trend**

**“Although [coral] reefs cover a minuscule fraction (0.1%) of seabed, they are second only to rainforests in biodiversity, sheltering or nourishing up to 9 million species -- a third of all known marine life forms -- including 4000 kinds of fish.”**

**--*Science Magazine* May 4, 2007, pg. 678.**

# **A third ocean problem: decimation of marine fisheries**

- 75% of ocean fisheries are overfished or fully depleted**
- 90% of the largest fish are gone**

# **The atmosphere: Global warming has brought...**

**...more and larger storms,  
floods, droughts**

- Multi-year drought is being experienced now in India, China, Australia and the western United States.**

# **Global warming (continued)**

- Loss of glaciers means loss of fresh water supplies for at least a billion people in Asia, who will seek water elsewhere.**

# **Big problem #2: The rapid extinction of species**

- Bats are dying**
- Honey bees are disappearing**
- Frogs and salamanders are declining worldwide**

**Extinction of species is normal  
and natural**

**But we have  
speeded up  
the historical rate  
of extinctions  
about 1000-fold**

**The *Millennium Ecosystem Assessment* (in 2005) said we will likely lose during this century:**

- **25% of all mammal species**
- **12% of bird species (in the U.S., 30%)**
- **33% of amphibian species**

**The U.N.'s *GEO 4* report (in 2007) said:**

- The Earth has seen five mass extinctions in the last 450 million years, the latest of which occurred 65 million years ago.**

# **The U.N.'s *GEO 4* report (continued):**

**"A sixth major extinction is under way, this time caused by human behaviour."**

**Big problem #3: industrial  
chemicals have contaminated  
the entire planet...**

**...from the tops of  
the highest  
mountains to the  
bottoms of the  
deepest oceans**

**There are 62,000  
chemicals in  
commercial use,  
the vast majority  
never tested for  
health or  
environmental  
effects.**

**About 700 new chemicals are put into commercial use each year, almost entirely untested for effects on environment or human health.**

**Pharmaceuticals  
and personal care  
products are now  
found in all our  
finished drinking  
water (the water  
you get from your  
tap).**

# **Examples of pharmaceuticals that are found in our drinking water:**

- pain killers**
- anti-depressants**
- antibiotics**
- stimulants**
- heart disease drugs**
- veterinary drugs**

**Essentially all  
freshwater fish are  
now contaminated  
with mercury and  
other industrial  
chemicals that  
mimic, or interfere  
with, hormones.**

**In all fresh waters of the U.S., male fish are turning into female fish because of chemical contamination.**

# **Four major discoveries about toxic chemicals just in the last 20 years:**

- 1) Hormone disruption**
- 2) Fetal programming**
- 3) Epigenetics**
- 4) A “body burden” of toxics in us all**

# **1. Hormone disruption**

**Hormones are chemicals that occur naturally in your blood. They act as messengers, turning on and off bodily processes.**

- **Hormones control growth, development and behavior in the womb and for the rest of your life.**
- **Industrial chemicals that act like hormones, or interfere with hormones, can – and do -- create medical havoc.**

## **2. Fetal programming**

**Fetal programming means that chemical exposures that occur in the womb can determine a person's growth, development and health for the rest of their life.**

# 3. Epigenetics

Epigenetics explains how environmental factors can change the way our genes work without changing the genes themselves.

# Epigenetics (continued)

**Surprisingly,  
these changes in  
the way our  
genes work can  
be inherited by  
our children and  
by *their* children...**

# **Epigenetics (continued)**

- This means that “the environment” influences us and our offspring far more powerfully than we previously knew.**
- “You are what your grandmother ate.”**

## **4. Our “body burden” of toxics**

**In recent years, many scientific studies have shown that all of us carry in our bodies a witch’s brew of toxic industrial chemicals at “low levels.”**

**Now let's take a fresh look at  
human health**

# **Environmental deterioration is taking a toll on human health:**

- 1) Asthma is increasing**
- 2) Diabetes is increasing, especially among children**

# **Declining human health (continued)**

- 3) Attention deficit/hyperactivity disorders (ADHD) are increasing**
- 4) Autism spectrum disorders are increasing**

# **Declining human health (continued)**

- 5) Parkinson's disease is increasing**
- 6) Several kinds of birth defects are increasing**
- 7) Childhood cancers are increasing**

**And all these health problems are worse among communities of color and communities of low income.**

**This is the true face of environmental injustice.**

**Now let's turn to**

**The Big Picture --**

**Today and in the Near Future**

# The U.N.'s Geo 4 report says

- We humans are currently using 54 acres per person (worldwide), but the Earth can only provide 39 acres

- **In other words,  
we have already  
exceeded Earth's  
"carrying capacity"**

**It is possible to  
exceed the Earth's  
“carrying capacity”  
temporarily but  
the result is  
permanent  
degradation of the  
global ecosystem.**

- **For example, soils can be forced to produce more crops, but eventually they become exhausted – a loss borne by future generations.**

**The Global  
Footprint Network  
estimates that the  
human economy  
is currently  
exceeding Earth's  
sustainable  
capacity by 20%.**

**In other words, to live sustainably with our present numbers in our present lifestyles, we humans would now require 1.2 planet Earths.**

- **If everyone on Earth lived the way we live in the U.S., humans would require six planet Earths.**

**There are one billion teenagers alive today (ages 13 to 19).**

- Human population is expected to increase 35% in the next 40 years (from 6.7 billion to 9 billion).**

- **Globally, the human economy is poised to begin a new period of rapid growth, at least 3% per year, thus doubling every 23 years.**

# **Millennium Ecosystem Assessment:**

- **Of 24 ecosystems studied worldwide, 60% are being degraded by human activities**

**"We're undermining  
our ecological capital  
all around the world."**

**-- Robert Watson, chief  
scientist of the World  
Bank**

**When the Millennium  
Ecosystem  
Assessment was  
released in 2005,  
the Board of  
Directors of the  
study issued this  
statement:**

**"At the heart of this assessment is a stark warning. Human activity is putting such strain on the natural functions of Earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted."**

**In sum:**

**The cumulative  
impacts of our  
economic activities  
are ruining the planet  
as a place suitable  
for human habitation.**

**We are wrecking our  
only home.**

**Part 2:**

**How did we get into  
this predicament?**

**And what can we do  
about it?**

**To stop the degradation of the ecosystem and restore human health, we could change the rules by which society makes decisions.**

- **Our present way of making decisions developed during the 19<sup>th</sup> century, when the world seemed limitless.**

- **Now that we are approaching (in many cases exceeding) ecological limits, our rules for making decisions need to adapt to new conditions.**

**Two aspects of our laws no longer make sense:**

**First, our legal system is set up to promote economic growth.**

**The law presumes that the benefits of economic growth always outweigh the costs, until a specific cost-benefit analysis can prove otherwise.**

**Even when an economic activity is causing obvious harm, the burden of proof rests on those who want the activity modified or stopped.**

**They must show that the costs (harms) are “unreasonable,” meaning the costs of the activity to society outweigh the benefits that the activity creates.**

**Proving that costs exceed benefits is a difficult burden to meet because:**

- **the necessary information about costs and benefits is often not readily available and...**

**...the proponents  
of an activity are  
under no  
obligation to  
provide the  
needed  
information.**

**Importantly, when we have scientific uncertainty or doubt, or the absence of information, the law defaults to its starting presumption:**

**Economic activity  
is presumed to  
provide more  
benefits than  
costs and so the  
law presumes that  
the activity should  
continue.**

**This is the main reason why the environmental movement has failed to stem the tide of ecosystem degradation despite 35 years of heroic effort.**

**As you can see,  
our legal and  
regulatory systems  
reward ignorance,  
uncertainty and  
doubt.**

**There is now a very substantial industry devoted to the manufacture of scientific uncertainty and doubt.**

**See: David Michaels,  
*Doubt is Their Product* (2008).**

**We need to shift the overarching goal of our legal system...**

**from promoting economic growth to protecting the integrity of the global ecosystem**

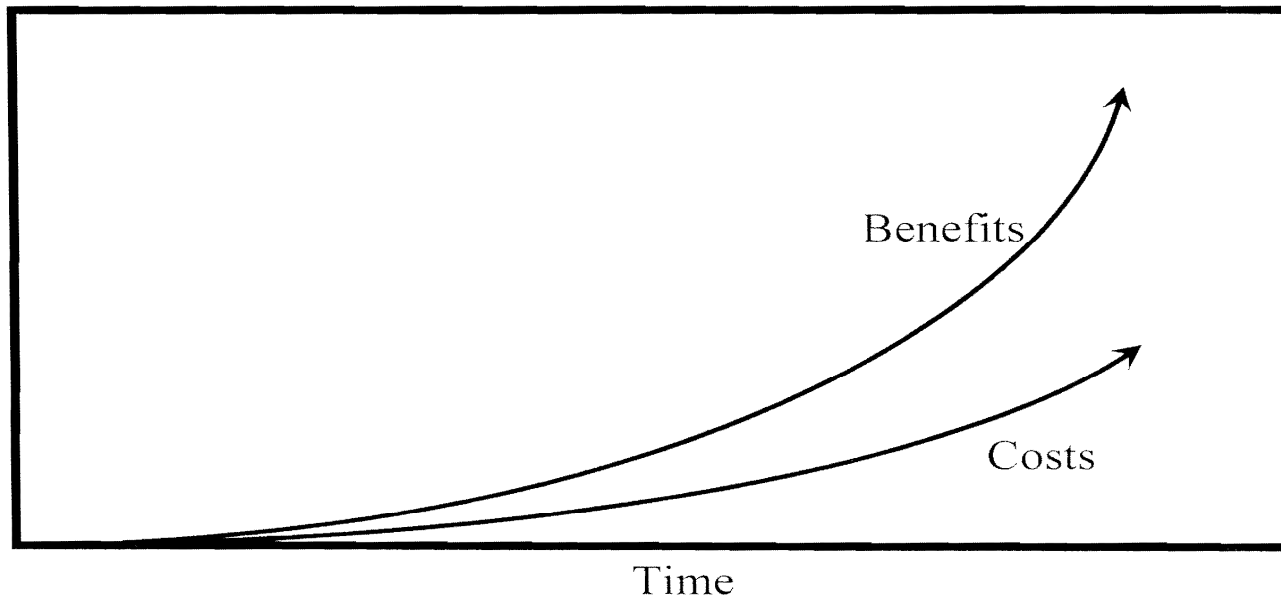
**The second aspect of our  
laws that no longer makes  
sense:**

**The law presumes  
that economic  
benefits and their  
related costs can  
grow forever,  
without limit.**

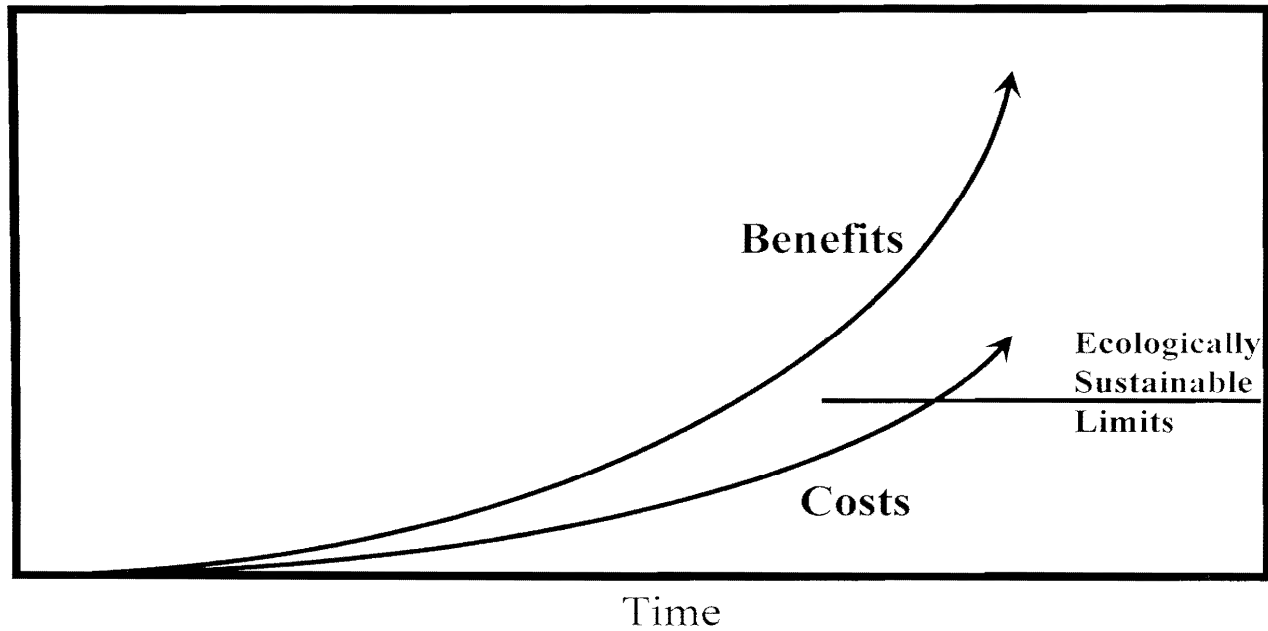
**The law presumes that the Earth's capacity to absorb harm is infinite.**

**This is a crucially important assumption built into our laws.**

**The Law Assumes:  
Both Benefits and Costs Can Grow Forever**



## Cumulative Environmental Costs Can Surpass The Earth's Ecologically Sustainable Limits



**This is why  
cumulative  
impacts  
are the central  
problem of our  
time:**

**Cumulative impacts are ruining the Earth as a place suitable for human habitation, yet the law does not even acknowledge that ecological limits exist and can be breached by cumulative impacts.**

**Why is this important?**

**So far as anyone knows, the Earth is the only place in the universe hospitable to human life.**

**If the Earth is our only home and our cumulative impacts are diminishing its capacity to support human life, then we are running the risk of an infinite loss – losing our only home in the universe.**

**Under these  
circumstances,  
cost-benefit  
analysis ceases to  
provide sound  
scientific guidance  
for policy.**

**Under these  
circumstances,  
justifying  
additional costs  
(harms) by  
balancing them  
against benefits no  
longer makes any  
sense.**

**We are living in a new world, one that is approaching or exceeding ecological limits (which, in turn, is causing many chronic human diseases to increase).**

**Therefore, we need new rules for making decisions.**

**We need to take every opportunity to reduce our footprint and avoid harm to the ecosystem.**

**Specifically, we  
need to abandon  
cost-benefit  
decision-making  
and...**

**...examine every  
decision that can  
impact the  
ecosystem (or  
human health)  
through the lens of  
the precautionary  
principle.**

# **The 4 parts of the precautionary principle:**

- 1. If we have evidence that harm is occurring, or is about to occur, we have a duty to take action to prevent harm.**

**2. We shift the burden of proof to the proponents of a product, process, or project. It is up to them to show...**

**(a) That their activity is being conducted in the least-harmful way possible; and...**

**(b) That their activity will not degrade the ecosystem or human health.**

**3. Because of uncertainty, after we make a decision we will monitor carefully and be prepared to act on early warnings and alter course.**

**Therefore, we will prefer to avoid irreversible decisions and irretrievable commitments.**

**4. We engage the public  
– really engage them –  
in decisions that affect  
their lives.**

**Wisdom and authority  
reside in the citizenry,  
not in experts, though  
of course experts have  
a role as advisers.**

**Using a precautionary approach, uncertainty, scientific doubt and missing data become reasons to take precautionary action and to not just press ahead assuming that benefits will outweigh costs.**

**The precautionary principle  
does not tell us what action to  
take.**

**But advocates for  
the principle have  
suggested the  
following...**

# **Nine kinds of precautionary action we can take:**

**1) Set goals (dream, then plan). Example: Sweden has set a goal of eliminating toxicants from breast milk in 20 years.**

**2. Engage the affected people in decisions. Really engage them.**

**There are many well-known processes and techniques for engaging the public deeply in decisions.**

**3. Reverse the burden of proof. Assume that any action that affects the ecosystem will be harmful, until shown otherwise.**

**In other words, give the benefit of the doubt to nature and to public health. It is not up to the public to prove harm.**

**We already take this approach with new pharmaceutical products.**

**New drugs are assumed to be harmful or useless or both until the drug company can prove both safety and efficacy**

**4. Examine all available alternatives for achieving the goal and choose the least-harmful way.**

**5. Consider all the evidence (no cherry-picking data, no ignoring inconvenient facts)**

**6. After a decision is made, monitor carefully (no sleep-walking).**

**7. Heed early warnings.**

**Be prepared to change course based on monitoring results.**

**8. Acknowledging that we may need to change course means that we should prefer to avoid irreversible decisions and irretrievable commitments.**

**9. Never make decisions in a vacuum.**

**Always examine the context – the other impacts to which any new impact will be contributing.**

**The precautionary principle is not anti-science.**

**This principle explicitly acknowledges the central role of scientific data (and scientific doubt) in decision-making.**

**It is cost-benefit balancing for decisions that is unscientific.**

**It ignores the thousands of studies that show that ecological limits can be exceeded by the cumulative impacts of costs that are justified by benefits.**

**Where did the precautionary principle come from?**

**We all use the precautionary principle every day in our own lives.**

**For instance, we may grow our own food, or buy organically-grown food, because of the dangers of pesticides.**

**Precaution grew out of grass-roots  
activists identifying problems –**

**Chemical dumps, tainted  
wells, polluted rivers, fish  
too toxic to eat, radioactive  
waste, pesticide poisonings,  
toxic waste left in  
communities of color, rising  
disease rates...**

# **Precaution developed in response to big mistakes of the past...**

- wholesale contamination of the Great Lakes**
- toxic lead in paint and in gasoline**
- pesticides**
- destruction of the ozone layer**

**Precaution comes directly from the central principle of public health: primary prevention**

**Precaution comes from the guiding principle of clinical medicine: first do no harm**

**Precaution comes from the German *vorsorgeprinzip*: the principle of foresight or forecaring**

**The European Union adopted the precautionary principle in its founding document (The Maastricht Treaty of 1990).**

# **Precaution comes directly from your grandmother:**

- Look before you  
leap**
- Better safe than  
sorry**
- A stitch in time  
saves nine**

**How is the precautionary principle being used?**

**Many cities and a few states now take a precautionary approach to pest management in schools, parks, playgrounds, and public buildings.**

**They have passed laws and regulations that chemicals will be used only as a last resort, after all other alternatives have been tried.**

- Many cities in Canada have passed local laws prohibiting the use of pesticides on lawns for cosmetic purposes.**

**The Supreme Court of Hawaii has ruled that the state must manage Hawaii's water resources using the precautionary principle...**

**...aiming to avoid harm to the resource, which the state holds in trust for present and future generations.**

**The City and County of San Francisco  
have adopted precaution...**

**...as overarching  
governmental  
policy, guiding all  
their decisions.**

**The Township of Lyndhurst, N.J.  
adopted the precautionary  
principle in 2008...**

**...to guide all  
municipal  
policies.**

**A model precautionary state law is available, modeled on the National Environmental Policy Act.**

**It takes into account cumulative impacts of decisions, fairness and justice in decisions, and the precautionary principle.**

**So there you have it.**

**The precautionary  
principle is a new way  
of making decisions  
for a new time.**

**These days, when it sometimes seems as if the future itself is endangered, precaution offers us a path forward.**

**Precaution  
offers us hope.**

# Acknowledgements

I am deeply indebted to Dr. Joseph Guth who has pioneered so much of the thinking about cumulative impacts and the law. See <http://tinyurl.com/nehyoj>

And see his model “little NEPA” law: <http://tinyurl.com/ljb9gm>

And see: <http://tinyurl.com/lqr5c7>