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Environmental Sociology

Chapter 3:

Examining Drivers (Root Causes) of Environmental Impacts

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The purpose of this chapter is to identify the human causes of the environmental impacts we are experiencing.

In review, what are the major environmental impacts that humans are causing?

Global warming
Water pollution
Air pollution
Land pollution
(e.g., plastics, metal products filling landfills)

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Before considering how humans are contributing to global warming, let's reconsider the argument of some that there is NO global warming and the argument of others that the global warming we are experiencing is NOT caused by humans.

What evidence do we have that the earth is getting warmer (we'll take a look at 6)?

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1. According to NASA, NOAA, (National Oceanic and Atmospheric Administration) and other climate agencies, the Earth's surface temperature has increased by approximately 1.1°C (2°F) since the late 19th century, with the last decade being the warmest on record.

- Since the late 1800s, scientists have used thermometers to measure surface temperatures worldwide
- NASA, NOAA, and the UK Met Office have compiled global temperature data from thousands of land and ocean-based weather stations since mid 1900s.
- Since the late 1970s, satellites have measured Earth's temperature using infrared sensors.

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(Evidence of global warming)

2. Greenland and Antarctica are losing hundreds of billions of tons of ice per year.

3. Global sea levels have risen by about 8 inches (20 cm) since 1880 due to melting ice and thermal expansion of seawater.

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4. Heatwaves, droughts, hurricanes, and wildfires are becoming more frequent and intense. Climate attribution studies show that many recent extreme weather events would have been unlikely without human-caused warming.

5. Animal migration patterns and plant blooming seasons are shifting. Coral reefs, like the Great Barrier Reef, are experiencing mass bleaching due to warmer ocean temperatures.

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6. Ice core samples confirm that CO_2 and temperature have moved in lockstep throughout history (i.e., when CO^2 has been higher in the atmosphere, temperatures have been warmer and vice versa).

An examination of atmosphere history shows that carbon dioxide levels have risen to over 420 ppm today—the highest in at least 800,000 years.

How have scientists determined this?

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Ice core data from Antarctica

Ice cores are drilled deep into glaciers and ice sheets, trapping ancient air bubbles.

These air bubbles contain samples of past atmospheres, allowing scientists to measure historical CO_2 levels directly.

The longest ice core records (from Antarctica) go back 800,000 years and show that CO_2 levels never exceeded 300 ppm before industrialization (today 420 ppm).

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Summary: The overwhelming body of evidence from multiple, independent scientific disciplines confirms, with basically no doubt, global warming is occurring.

The scientific consensus (from NASA, NOAA, IPCC, and other major organizations) is that human activity—mainly the burning of fossil fuels—is the primary cause.

What evidence is there that CO^2 is causing the global warming beyond what would occur naturally?

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1. Greenhouse Effect: If the warming were due to the Sun, the entire atmosphere would warm. Instead, only the lower layers are warming, which is consistent with greenhouse gas effects.

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2. Satellite measurements show that the Earth is retaining more heat, with less infrared radiation escaping at the exact wavelengths that CO_2 absorbs heat.

CO_2 strongly absorbs infrared radiation at wavelengths around 15 μm. This means that when heat tries to escape from the Earth, CO_2 molecules capture it at this wavelength and then re-emit it in all directions, keeping more heat in the atmosphere.

The conclusion is that CO_2 is trapping heat, not natural cycles or external factors.

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In Sum: if warming were caused by the Sun or other natural factors, we would see an overall increase in ALL infrared radiation escaping into space.

Instead, satellite measurements show a decrease at CO_2-specific wavelengths, proving that CO_2 is trapping heat.

This is one of the clearest physical fingerprints of human-caused global warming.

What about methane?

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Like CO_2, methane absorbs and re-emits infrared radiation, preventing heat from escaping into space.

It absorbs infrared radiation at different wavelengths (around 7.7 μm), complementing CO_2's absorption bands.

About 60% of methane emissions come from human activities including:

fossil fuel extraction (natural gas leaks, coal mining, oil drilling), agriculture (livestock digestion, manure, rice paddies), landfills and waste (decomposing organic matter). The rest comes from natural sources like wetlands and permafrost.

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Chapter 3 of Stuart's book focuses on the "human causes" of the environmental impacts we are experiencing.

Why should we care what the human causes are? Why not just try to fix the problems that we have?

It's analogous to health. We don't want to only fix the immediate health problem. We want to know what caused us to get sick so we can avoid it occurring again.

So, what are some of the human causes? (there's at least 8)

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(Overview of Root Causes)

- Population growth
- Individual consumption
- Economic growth/capitalism
- Technological innovation
- Social structures such as how our political system works
- Urban planning and development (location of roads, housing, availability of public transportation)
- Ignorance—unaware of behavioral effects
- American values and practices

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(Overview of Root Causes)

- What American values and practices affect global warming?

--materialism/capitalism/consumption

--individualism/if we can find a way legal way of earning more $ we take it even if it means polluting

--lifestyle practices (waste water, overuse of oil based products, trashing environment)

--number of work hours/week

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When considering global drivers/causes:
(at the level of nations)

Scientists have proposed IPAT to explain the level of environmental impact by a society:

Env. **I**mpact = **P**opulation * **A**ffluence * **T**echnology

(Env. Impact is sometimes thought of as the ecological footprint)

What does this formula say?

Which of the three do you believe is most important?

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Many scientists believe affluence is most important, measured as: the Gross Domestic Product per capita

GDP=total value of goods and services produced / population size

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A growing GDP over time means people have more goods and services over time (they are more affluent). The general population and economists in particular view this as a desirable situation. Why?

So what is the problem with a growing GDP?

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Research has found that:

- As GDP goes up (i.e., economic growth per person)
  - --goods/service use goes up
  - --species endangerment goes up
  - --deforestation goes up
  - --wealthiest 10% produce 36% of all carbon emissions

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GDP is highly associated with carbon emissions and biodiversity loss (richer countries emit more carbon)

So, when revisiting the IPAT formula:

Env. Impact = Population * Affluence * Technology

Why might affluence be considered most influential? Why not population or technology?

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In the future, could there ever be a situation where increased GDP does not contribute to global warming?

If yes, how would it be possible and what does this mean?

If no, what does this mean?

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If no:

Affluent nations may need to reduce their economic growth which could mean fewer jobs, lower pay checks since companies are selling less. Some environmental sociologist adhere to this view.

If yes…

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If yes:

Affluent nations will need to identify how they can grow without contributing further to the ecological footprint. Some Environmental Sociologist adhere to this view.

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As GDP goes down
(such as during recessions)

--carbon emissions go down
as less is produced and consumed

If this is true, what do you think happened during the pandemic?

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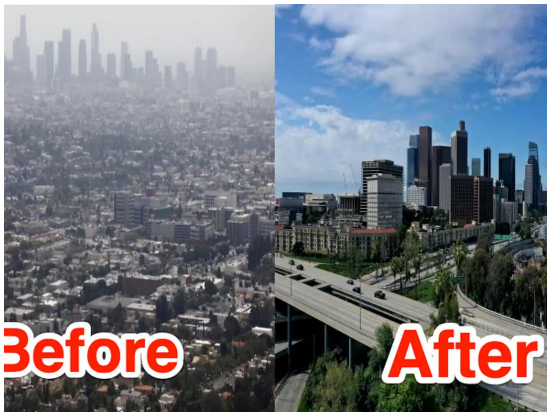
Los Angeles before and after pandemic "stay at home" order.



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Env. Impact = Population * Affluence * Technology

What about technology?
How important is it to global warming?

Does increased technology always mean more pollution?

If yes, what does this mean for strategies for reducing pollution?

If no, what does this mean for strategies?

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When considering individual drivers of pollution (at the individual level):

What would you guess are some of the most influential (largest) human drivers/causes of global warming—list three (what do individuals do to contribute to GW)?

Transportation
Housing
Consumption of goods

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What percentage of all carbon emissions in the U.S. are contributed by motor vehicles?

Nearly one-fifth (20%) of all US carbon dioxide emissions come from motor vehicles (reported by Union of Concerned Scientists).

One gallon of gas produces roughly 24 pounds of carbon dioxide and other global-warming gases.

Wealthier individuals emit more carbon per person (e.g., travel more, own boats, large cars, own things).

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Why do people want to consume a lot of goods, even when this may be harmful?

"Values-Beliefs-Norms Theory" explains how specific values result in specific beliefs and these, in turn, result in norms that people follow (e.g., gift-giving at Christmas).

"Norm Activation Theory" explains that people focus on consequences of various behaviors and this activates their norms and behaviors.

How are these theories different?
Which theory do feel is most accurate?

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The Sociology of Consumption focuses on social class and "conspicuous consumption."

How might this influence behavior and norms?

The Sociology of Consumption also studies/focuses on the social system of advertising and marketing, each of which "pushes" more personal consumption, also referred to as "false commodities."

Why would it be called this?

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Karl Marx argued that the "structure of society" contributes to environmental degradation as well as social injustice.

Can you guess what his primary argument was (what did Marx focus on?)

He focused on capitalism and production (what we've been talking about).

For example, applying capitalism to agriculture resulted in soil degradation. Capitalism to fishing has disrupted marine food chains and ecosystems (referred to as "oceanic rift").

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How about the "treadmill of production" (some call it the treadmill of destruction)? What might this be referring too?

The goal of ever-increasing profit drives production (like a treadmill) and causes environmental degradation.

What does the following mean:

Personal preferences don't drive production, instead, production drives personal preferences.

How can this be? False commodities

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Is anyone familiar with metabolic rift theory? (what does metabolic refer to? What comes to mind?)

Metabolic refers to the total of all chemical changes that take place (typically referring to changes in cells).

When applied to environmental pollution, it's the chemical changes that are occurring resulting in a lack of balance (i.e., there is a rift) between Co2 being released into the atmosphere and then captured by plants, etc.

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Should social and economic well-being be prioritized ahead of economic development/profit and market logic or vice versa?

What would be an example of economic development being prioritized ahead?

Gentrification (e.g., Bishops Arts District)

Allowing industry to pollute (e.g., toxic chemicals, global warming)

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At the end of the chapter Stuart discusses the role of ideology. To some degree, this seems to be something we have been discussing all along.

So, what do we mean by "ideology?"

"An individual's world view or general beliefs about what exists, what is good and bad, and what is possible."

What would be an example?

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Example: differing political ideologies

Another example: "domination ideology" --the view that the world was created for humans to dominate and to do as they see fit.

Is this ideology a feature behind the constant push for economic growth?

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Among environmental advocates domination ideology has been referred to as a "contradiction concealing" ideology.

The ideology allows those in power to continue their ignoring of environmental problems which is contradictory to having a healthy environment.

The ideology of overconsumption masks the dangers that are caused to the environment.

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Innovating to zero! | Bill Gates, 2010 (18:00/29:32)
https://www.youtube.com/watch?v=JaF-fq2Zn7I

Why people want to put small nuclear reactors everywhere 13 min
https://www.youtube.com/watch?v=GhKQ8EP1a1Y

The Problem with Solar Energy in Africa Real Engineering 18min
https://www.youtube.com/watch?v=7OpM_zKGE4o

The Micro Modular Reactor: Reliable Zero-Carbon Energy Anywhere (7:50 mins)
https://www.youtube.com/watch?v=6PB1OM2yy8I

Small Nuclear Reactors Have A Big Problem (first 6 mins)
https://www.youtube.com/watch?v=XECq9uFsy6o

Nuclear micro reactors to hit the market (2:40)
https://www.youtube.com/watch?v=4z8btElDwBs

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Why people want to put small nuclear reactors everywhere 13 min
https://www.youtube.com/watch?v=GhKQ8EP1a1Y

Bill Gates on How we're doing on the path to zero emissions, 2022 (3 min)
https://www.youtube.com/watch?v=ipkPcrNsCv8

Bill Gates' Terrapower and the Natrium Reactor | Rock Logic | 2022 (start at 1 min – 6 mins)
https://www.google.com/search?client=firefox-b-1-e&q=rocklogic+and+terra#fpstate=ive&vld=cid:d6a53627,vid:_3mZIPO60zw

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How We End Consumerism (why degrowth must happen) (11:45)
https://www.youtube.com/watch?v=omcUaD8pxaY

Why renewables can't save the planet | Michael Shellenberger (show first 11:45 mins)
https://www.youtube.com/watch?v=N-yALPEpV4w

The Problem with Consumerism (10:21)
https://www.youtube.com/watch?v=x0ckvo2Z5BU

The dirty secret of capitalism -- and a new way forward | Nick Hanauer (show first 9 min and then remaining 8 mins)
https://www.youtube.com/watch?v=th3KE_H27bs

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Our Planet: Our Business (biodiversity)(show 17-20mins of 36)
https://www.youtube.com/watch?v=JdWQJq2OkJs

Our Planet | Frozen Worlds | 53 mins, FULL EPISODE | Netflix
https://www.youtube.com/watch?v=cTQ3Ko9ZKg8

Climate Change - We are the PROBLEM & the SOLUTION (9 min)
https://www.youtube.com/watch?v=-D_Np-3dVBQ

Causes and Effects of Climate Change | National Geographic (3 min)
https://www.youtube.com/watch?v=G4H1N_yXBiA

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