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Environmental & Energy Management Institute
SCHOOL OF ENGINEERING & APPLIED SCIENCE

Impacts of COVID-19 on Economics and Sustainability

IAEE Webinar April 20, 2020

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Registration open of the GWU Enterprise
Resilience 3-week course.

<https://eemi.seas.gwu.edu/enterprise-resilience>



Security And
Sustainability Forum

Convening Global Experts to Guide Decision Making

www.ssfonline.org

Sustainability at a Crossroads

Energy is Key to Everything

Its an essential driver of the natural world and of the human world, and it will also be pivotal to the societal transformations we'll be experiencing in the 21st century and beyond.

Energy is what enables us to live, and to build civilizations and thriving economies.

But it's even more fundamental than that. Without energy, literally nothing can happen.



<https://education.resilience.org/>

We are a Problem

Exponential growth of world population

It took 127 years for the world population to double from one billion to two. By contrast, it took only 47 years, from 1927 to 1974, to double from two billion to four. Since 1960, world population has grown by about one billion every 13 years. Each point represents an additional one billion people.

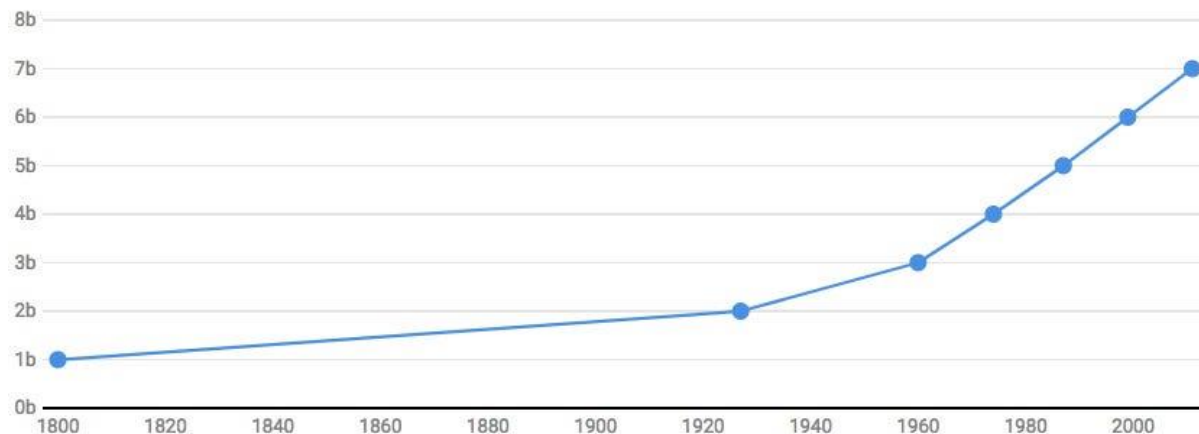


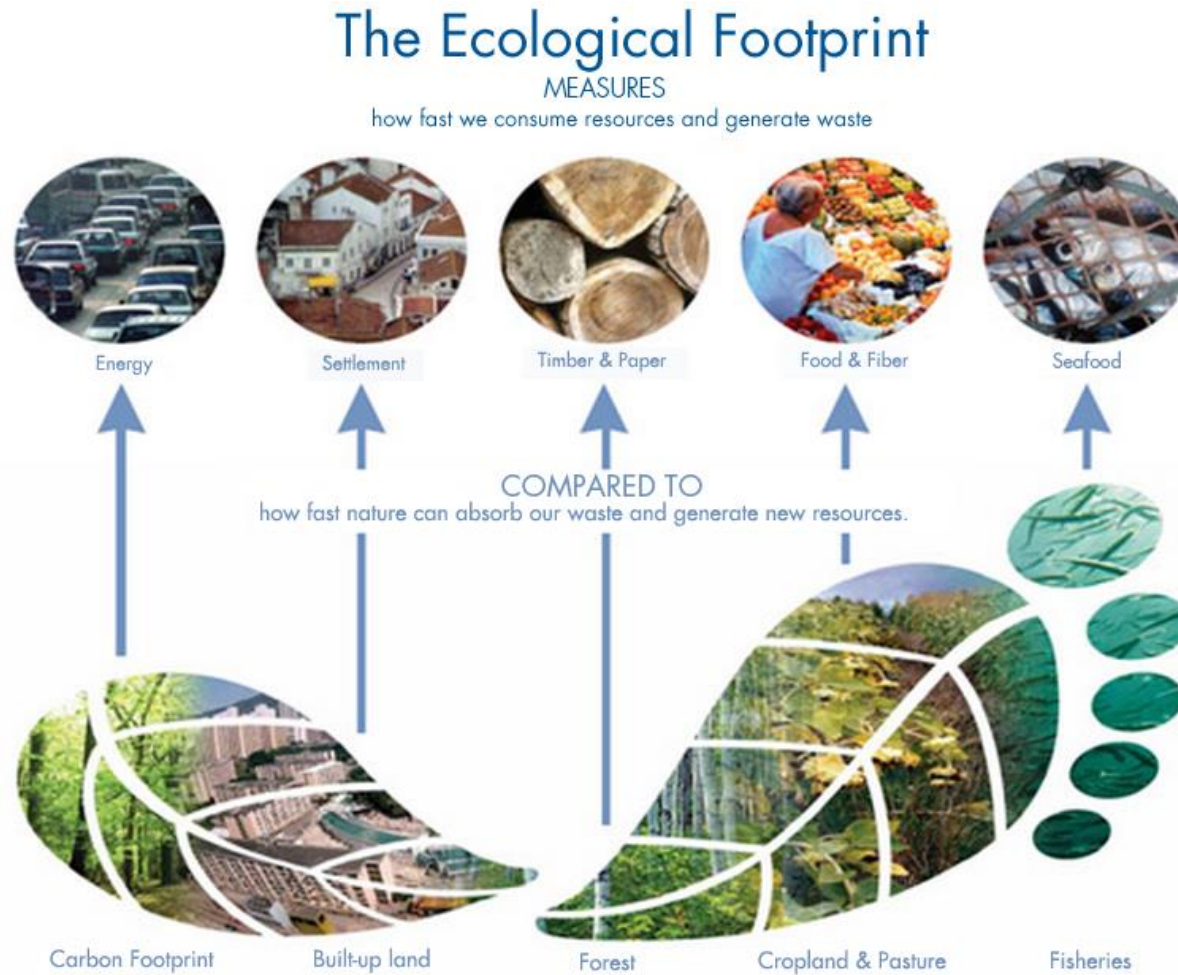
Chart: The Conversation, CC-BY-ND • Source: [United Nations](#) • [Get the data](#)

- The world's population has reached the vicinity of 7.5 to 7.6 billion people.
- Since 1960, world population has grown exponentially by about one billion every 13 years.

World population numbers are projected to reach 8 billion around 2023 and expected to level off around 10 to 12 billion by 2100. Thomas Peter/Reuters

- Humans have a large ecological footprint — we are the most populous mammal on Earth today.
- But the Earth will only have capacity for the population to a point until premature death by starvation and disease balances the birth rate.
- World Health Organization figures show 2.1 billion people lack access to safe drinking water, and 4.5 billion lack managed sanitation.

We use 1 ½ of the Planet's Annual Regenerative Power



Humanity's Unsustainable Environmental Impact

A Bad Track Record

- 85% of wetlands present in 1700, lost by 2000
- \$2 to 575 Billion in crops at risk from pollinator loss
- Only 7% of fished stocks under fished.
- 32% of forest lost from pre industrial levels.
- 50 times higher per capita GDP in developed vs least developed countries
- 300+ million tons of toxics dumped into waterways
- 10x increase in plastic pollution since 1980
- \$345 billion: global subsidies for fossil fuels resulting in US\$5 trillion in overall externality costs

1,000,000 species threatened with extinction



Result of a monetary vs ecological economy

Increasing Threats

'Toxic Stew' Stirred Up by Disasters Poses Long-Term Danger, New Findings Show

By Christopher Flavelle

New York Times: July 15, 2019

WASHINGTON — New research shows that the extreme weather and fires of recent years, similar to the flooding that has struck Louisiana and the Midwest, may be making Americans sick in ways researchers are only beginning to understand.

By knocking chemicals loose from soil, homes, industrial-waste sites or other sources, and spreading them into the air, water and ground, disasters like these — often intensified by climate change — appear to be exposing people to an array of physical ailments including respiratory disease and cancer.

The cost of natural disasters this year: \$155 billion

By Angela Fritz

Washington Post: December 26, 2018

Natural disasters cost \$155 billion this year, and several of them struck the United States particularly hard. Hurricanes Michael and Florence, the California wildfires and Hawaii's volcano eruption are all on the list of the most expensive global disasters of 2018, according to the Zurich-based reinsurance company Swiss Re.

"Like last year, the losses from the 2018 series of events highlight the increasing vulnerability of the ever-growing concentration of humans and property values on coastlines and in the urban-wildlife interface," Swiss Re said of its report. "The very presence of human and property assets in areas such as these means extreme weather conditions can quickly turn into catastrophe events in terms of losses inflicted."

Mother Nature Hits Back

E Lesson 21 Conclusions

Case in Point: Pandemics

Watch later Share



Business Impacts

- Lost productivity
- Lost continuity
- Supply chain disruptions
- Demand reduction
- Lost shareholder value

Reported (as of March 3, 2020)

Globally: 92,871 confirmed cases
in 80 countries worldwide
(about 50% have recovered)

3168 deaths

China: 80,152 confirmed cases
2945 deaths

The World Bank estimates that if coronavirus continues to spread it could cause economic losses of more than **\$3 trillion** globally.

Causes of Turbulence

Gradual stresses

- Population growth
- Deforestation
- Climate change
- Sea level rise
- Urbanization
- Rising income gaps
- Smartphone proliferation
- Deteriorating infrastructure



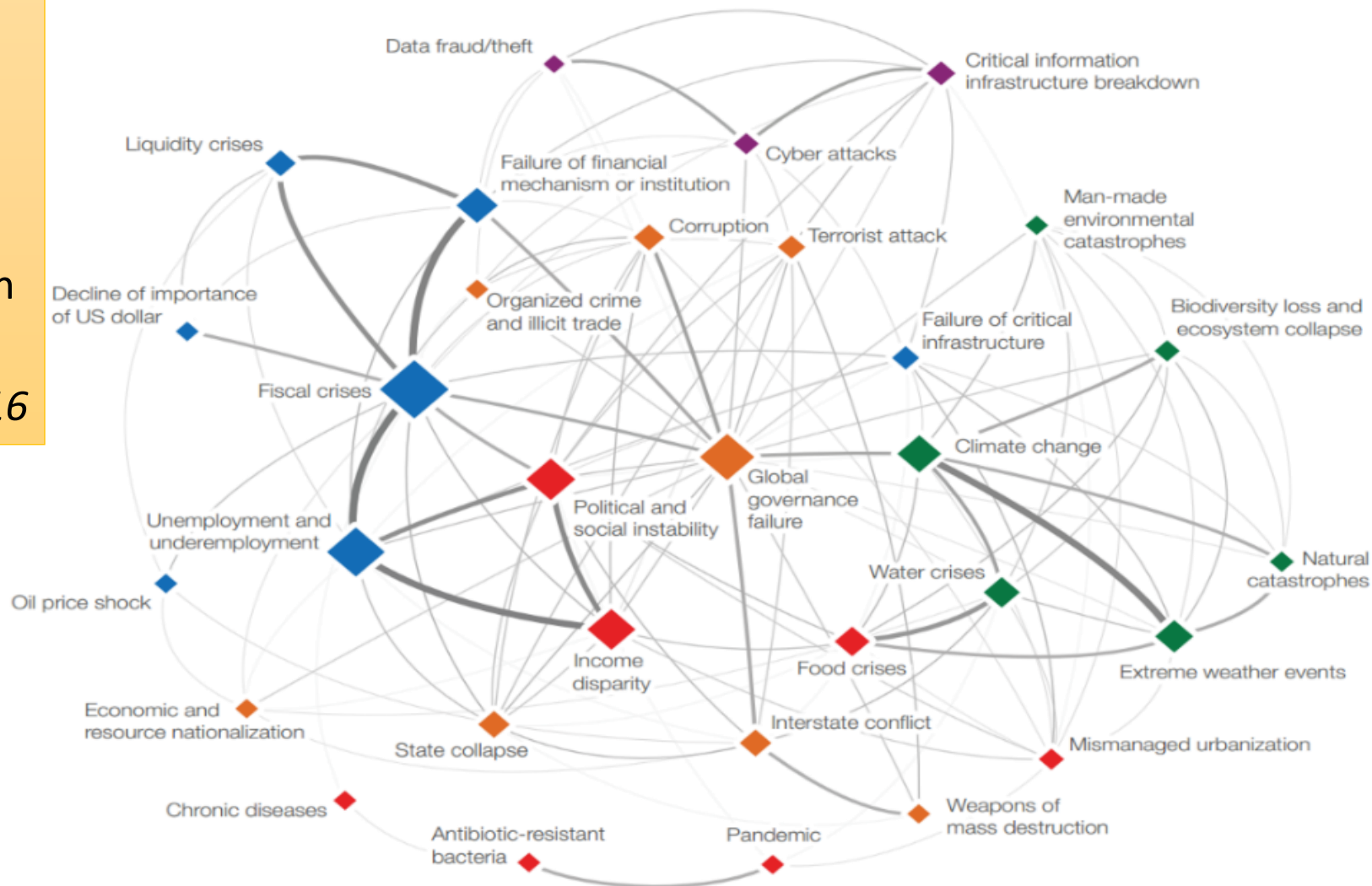
Sudden shocks

- Hurricanes
- Floods
- Forest fires
- Industrial accidents
- Power failures
- Economic collapses
- Terrorist attacks
- Political upheavals

Globalization and a Networked and Uncertain World

“The increasing volatility, complexity and ambiguity of the world...calls for a **resilience imperative** – an urgent necessity to find new opportunities to mitigate, adapt, and build resilience against global risks through collaboration among diverse stakeholders.

— *WEF Global Risks Report 2016*



- Ecological
- Economic
- Political
- Societal



- **Resist change**
Design operations for stability, predictability, and efficiency
- **Anticipate change**
Prepare for disruptions based on experience and foresight
- **Embrace change**
Design an adaptive organization that innovates in the face of emerging challenges



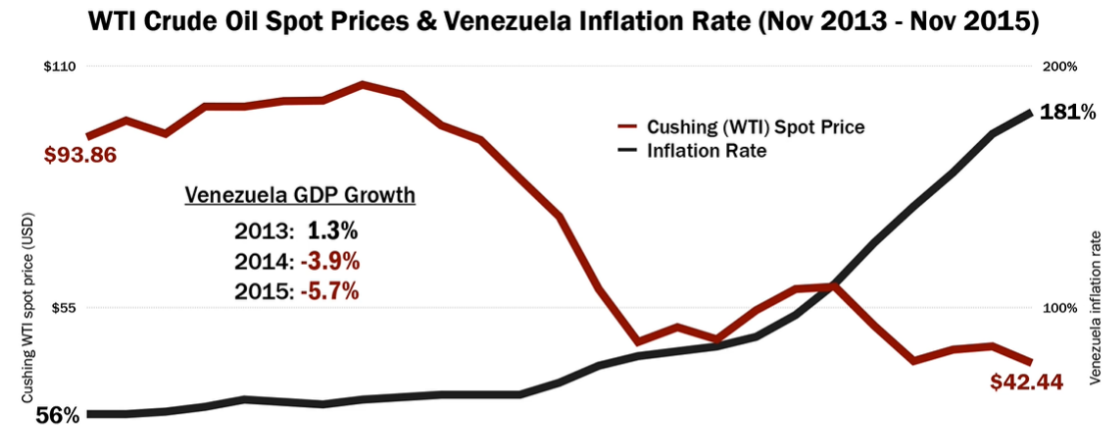
Efficiency Increases Profits and Minimizes Economic Waste But ...

Efficiency is subject to the law of diminishing returns.

Economies of scale can reduce prices, but as the scale of production goes up, so does the requirement for infrastructure--for transport, distribution, waste cleanup, and so on.

Efficiency also leads to economic stratification, both within regions (because some professions are more highly rewarded than others) and across regions (as manufacturing moves to places with lower labor costs).

- **Building resilience means supporting distributed processing and network storage.** Decentralization and redundancy are the watchwords.
- **Translating that strategy to business and communities,** implies localization as opposed to globalization; and it would mean encouraging a certain level of redundancy in services and inventories, as opposed to the radical streamlining of supply chains..

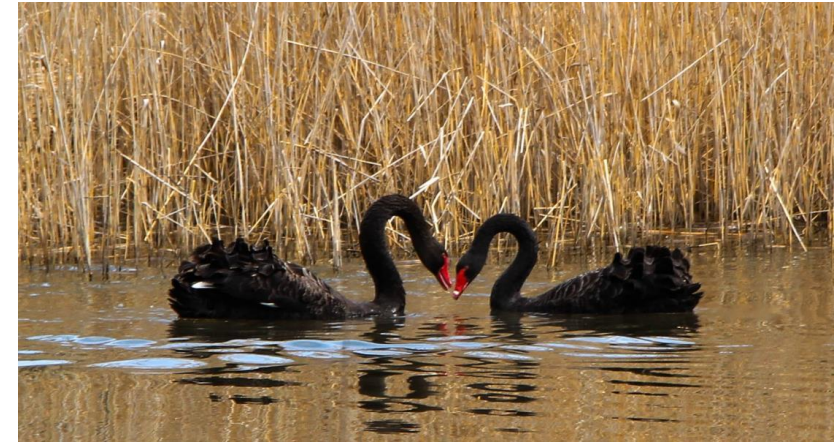


Inequity - Unintended Consequences of Economic Efficiency

Payoffs from economic efficiency typically go to companies and investors, while the costs are increasingly borne by society. What are those costs?

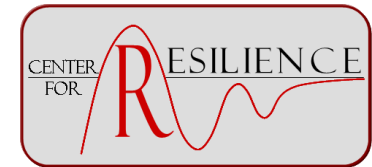
- Lost jobs for higher-paid wage laborers in wealthier countries
- Loss of the skill base and production infrastructure within those nations.
 - The offshoring of manufacturing to poorer nations may result in a reduction of domestic pollution,
 - But a dramatic increase of pollution in exporting nations, which have less stringent regulations.
- Economic inequality increases, both within nations and between nations.

And as regions specialize, there is an overall loss of local diversity in jobs.



Resilience is a Partial Rescue

... the capacity of living systems* to survive, adapt, and flourish in the face of turbulent change



Real-time Resilience
“bounce back”

Coping with unforeseen disruptions

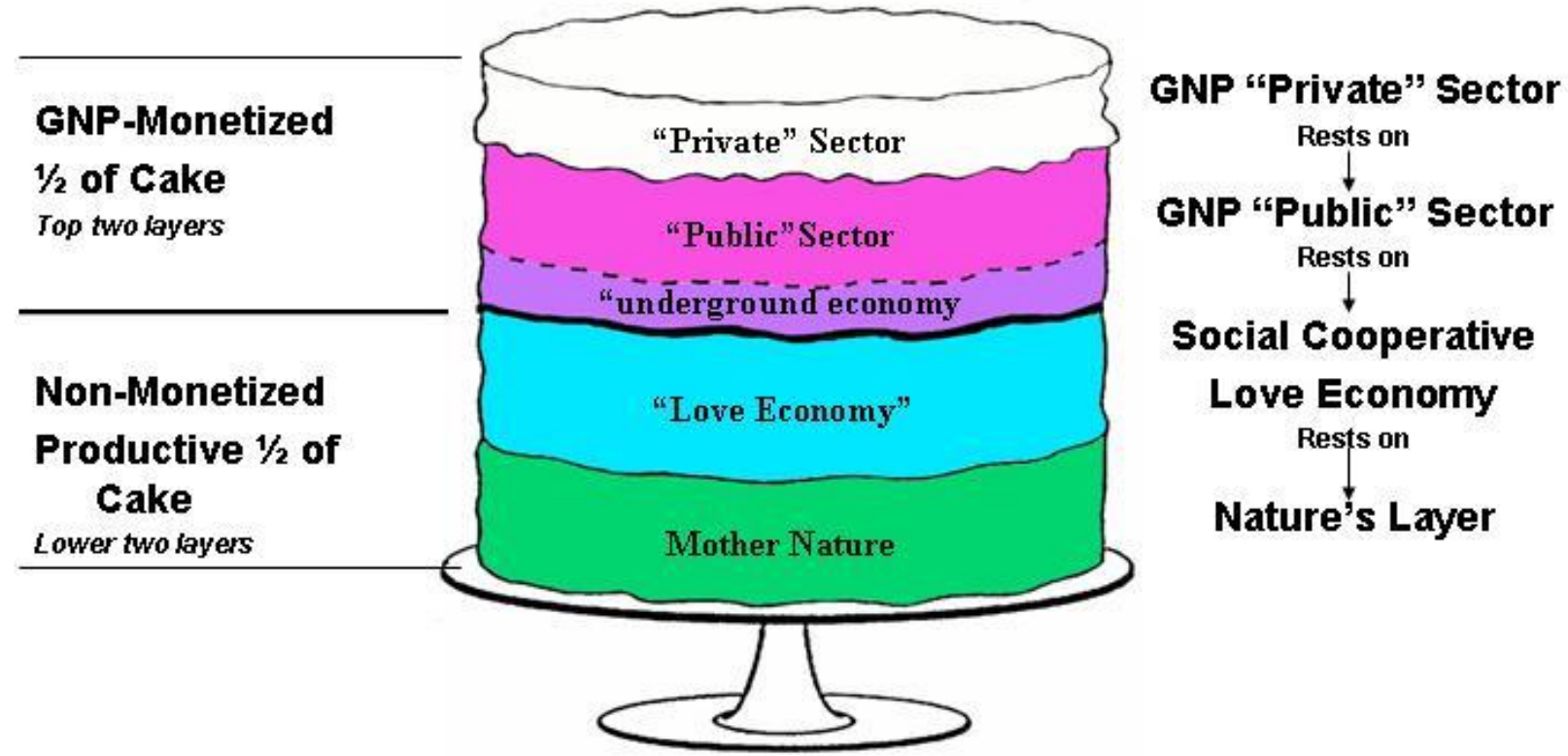


Sustainable Resilience
“bounce forward”

Adapting to a changing environment

*Organisms, communities, enterprises, ecosystems

Total Productive System of an Industrial Society (Layer Cake With Icing)



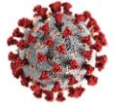
At the Crossroads

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Ecological Economy, Ecosystem Services, Resilience, Equity

Caves – Fire – Fossil Fuel - Industry
Monetary Economy - Inequity, Degradation



Monetary Economy, Continued Degradation, Inequity, Instability



Joseph Fiksel, GWU Enterprise Resilience Short Course
<https://eemi.seas.gwu.edu/enterprise-resilience>
Registration is open for the June 1 course

Nearly 100 critically endangered sea turtles have hatched on a deserted beach in Brazil, their first steps going almost unnoticed because of coronavirus restrictions that prohibit people from gathering on the region's sands.

Coronavirus keeps crowds that usually greet hatching of hawksbill turtles away



▲ Hawksbill turtles lay their eggs in the sands along Brazil's north-east coast. Photograph: Paulista City Hall

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