A Challenge to the Lower Columbia River Community – Weaving Climate Mitigation into our Conservation and Restoration Programs

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Messages

1. Scientists Warning on the Climate Crisis
   - The longer we wait, the greater the impacts and fewer choices we will have
2. All of us agree we should be focusing our work on Climate Smart and Adaptation Practices Now
3. Climate Mitigation is Critical = Our Restoration and Protection Projects can be Nature-Based Solutions

AR6 Synthesis Report (6th Assessment Report); IPCC, 2023

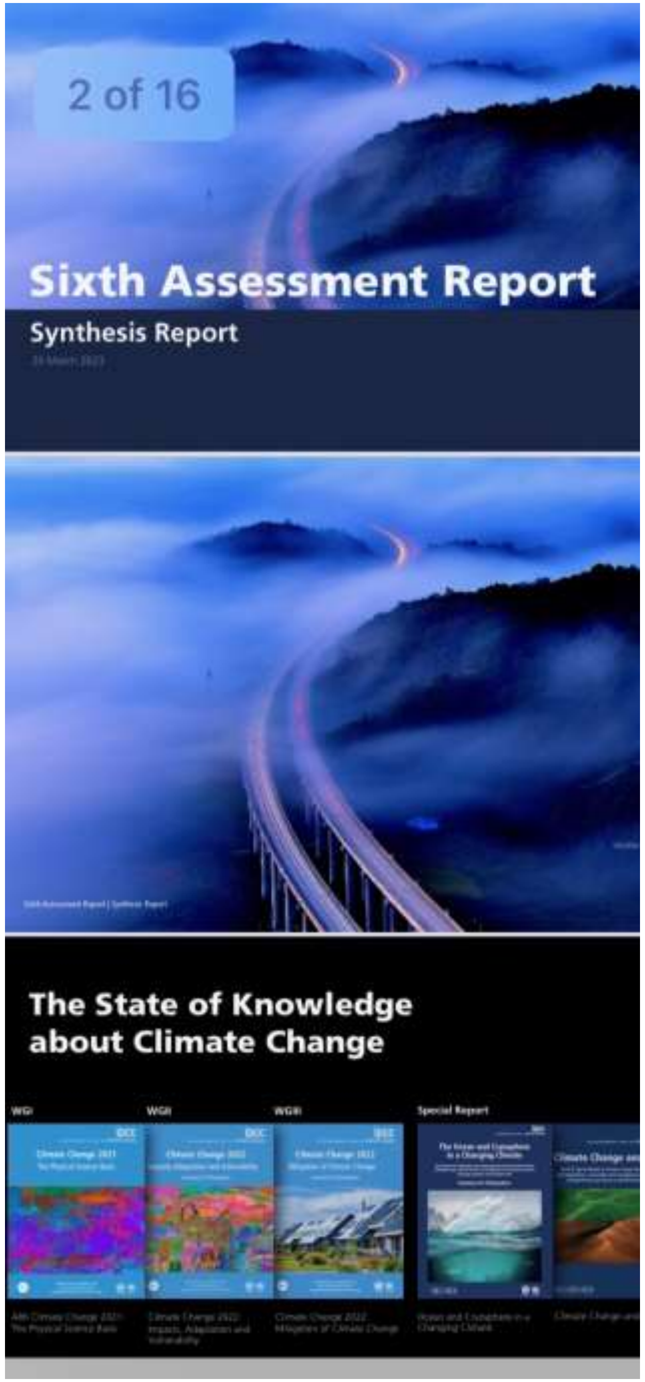
B.4.1 The effectiveness of adaptation, including ecosystem-based and most water-related options, will decrease with increasing warming.

There are limits to adaptation and adaptive capacity at global warming of 1.5°C, and with every increment of warming, losses and damages will increase.

The longer emissions reductions are delayed, the fewer effective adaptation options.

B.5 Limiting human-caused global warming requires net zero CO_2 emissions.
B.5.1 …requires deep reductions in CO_2, methane, and other GHG emissions... Carbon dioxide removal (CDR) will be necessary to achieve net-negative CO_2 emissions.

B.6 All global modelled pathways that limit warming to 1.5°C … and those that limit warming to 2°C…involve rapid and deep and…immediate greenhouse gas emissions reductions in all sectors *this decade*. Global net zero CO_2 emissions are reached…in the early 2050s and around the early 2070s, respectively.

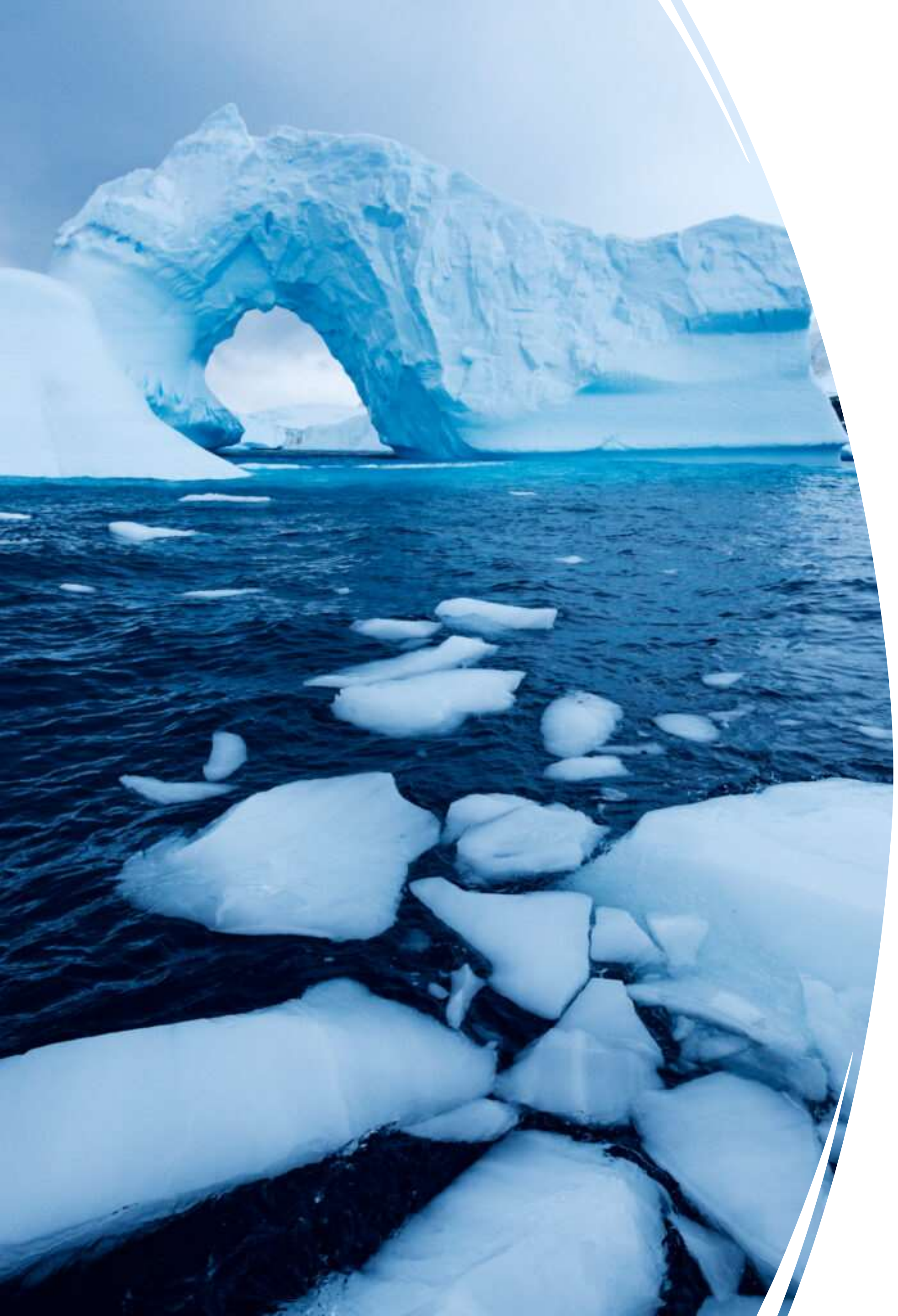


IPCC, 2023: *Climate Change 2023: Synthesis Report.* A Report of the Intergovernmental Panel on Climate Change (IPCC). Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, (in press)

We hear about the latest warning and then…

Distraction…the next thing

Oh look - it’s a cute cat video



U.S. Greenhouse Gas Emission Reduction Goals

Federal

- In April 2021 President Biden announced the target of reducing GHG emissions by at least **50% below 2005 levels by 2030 and to reach net-zero GHG emissions by 2050** with the goal of **limiting warming to 1.5°C** above pre-industrial times
  - 100% carbon pollution-free electricity by 2035
  - Reducing GHG from transportation sector and buildings
  - Increase carbon capture and technologies in industry
  - Reducing GHG from forests, agriculture and **enhance carbon sinks** including **nature-based solutions for ecosystems and agricultural soils**

U.S. Greenhouse Gas Emission Reduction Goals

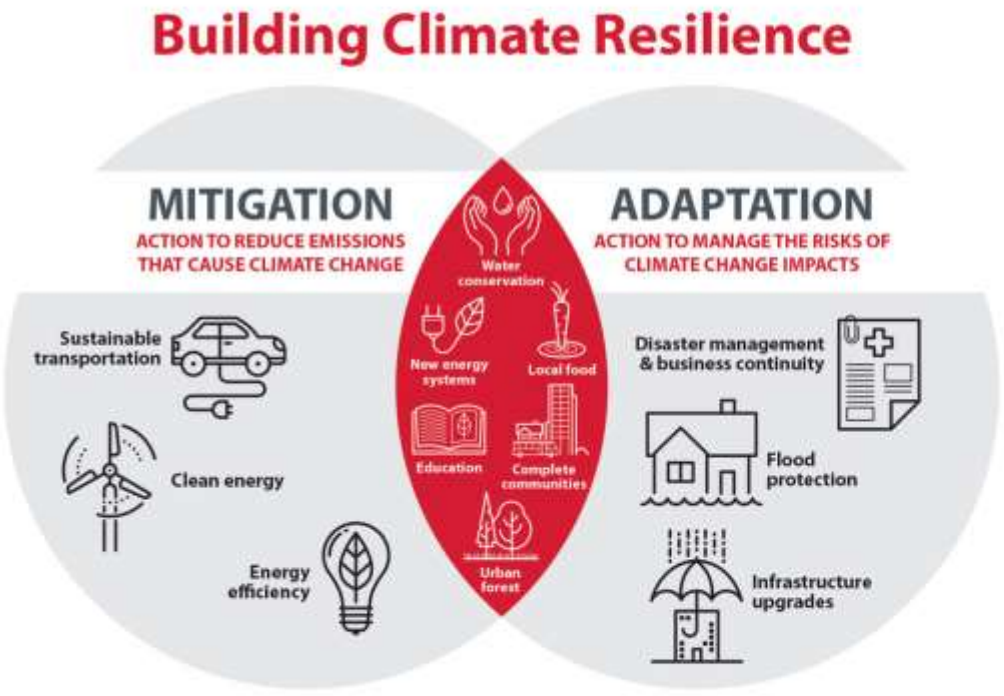
State

- **Washington's Climate Commitment Act (CCA): reduce GHG emissions by 95% by 2050**
    - **Cap-and-invest program** by setting an emissions cap that lowers over time to meet the goal and using a market-based system that could link to similar programs in California and Quebec

- **Oregon's Climate Action Plan (CAP): reduce emissions by 45% below 1990 levels by 2035 and by at least 80% by 2050**
    - Directs ODEQ to **cap and reduce** emissions from large stationary sources and major fossil fuel emitters
    - Focuses on reducing carbon in transportation sector (roughly 40% of GHG emissions), increasing energy efficiency of buildings, investing in renewable energy, and integrate **nature-based solutions for carbon sequestration** and storage on Oregon's **natural and working lands**.
- Both states focus reducing emissions from largest polluters and protecting vulnerable communities as an environmental justice and equity issue

Definitions – Climate Adaptation vs Mitigation

- **Climate change adaptation** means addressing the effect but not the cause - adjusting our behavior, project designs, and ways of life to protect species, habitats, and the environment from the impacts of climate change.
- **Climate change mitigation** means addressing the cause - avoiding and reducing greenhouse gas emissions to prevent and reduce the planet from warming.
- The more we reduce emissions (mitigate) now, the easier it will be to adapt to the changes we can no longer avoid.



Example Climate Adaptation Measures

- ✓**Set back levees, elevating infrastructure, or retreating from low-lying coastal areas** in response to increased flooding with sea level rise and more intense and frequent storms.
- ✓**Designing bridges and culverts to withstand bigger flows** from sea level rise and more intense, frequent storms.
- ✓**Identifying, protecting and enhancing cold water refuges, hyporheic exchange** in response to warming temperatures.
- ➢**Favoring drought-tolerant plant species in plant establishment projects** in response to decreasing or more variable precipitation.
- ➢**Using prescribed fires to prevent larger, uncontrollable wildfires.**
- ➢**We all should be including adaptation techniques in our projects NOW**

Our New Challenge – Add Mitigation

During the *Design Phase* of Restoration Projects:

1. Think about your emissions associated with projects

- Emissions with heavy equipment use
- Emissions with infrastructure concrete and steel (culverts, bridges, roads)
- Sources of LWD and transport/installation
  - Blow down, fire damaged, or forested??
- Emissions from disturbing organic soils

2. Identify ways to reduce that footprint

- Focus work on infrastructure and minimize grading
  - let the river do the work (e.g., reconnect valley bottom)
- BDAs and other approaches implemented by hand
- Adjusting infrastructure requirements
- Source wood and materials from onsite

Our New Challenge – Add Mitigation

Where you cannot avoid CO_2 emissions, offset by additionality

1. **Calculate CO_2 emissions:**

- Amount of diesel, gas burned by heavy equipment use
- Quantify concrete and steel in abutments, culverts, bridges for infrastructure
- Sources of LWD - whether trees were sequestering carbon before forested for your project – how many taken down, calculate CO2 from transportation and installation at site

2. **Calculate quantity of plantings needed to offset the CO_2 emissions to make project carbon neutral**

- Carbon Riparian Ecosystems Estimator for California (CREEC) or Forest Vegetation Simulator (FVS) provide a good (uncertified) estimates*
- Add this amount to planting footprint you would normally do for “additionality”

*City Forest Credits, a Seattle-based Carbon Registry, is a carbon registry that makes their protocols available; their protocols for *certifying* carbon credits are available here: https://www.cityforestcredits.org/carbon-credits/carbon-protocols/

Steigerwald Floodplain Reconnection Project

Activities included:

- **1.7 million cubic yards of soil** moved with large diesel-burning construction equipment to build the setback levees and create wetlands
- Burning **429,491 gallons of diesel** fuel
  - One gallon burns 22.6 lbs of CO_2
  - Equates to **9,706,496** lbs of CO_2
- **1,080 cubic yards of concrete** poured for a flood wall, two bridge abutments, and other infrastructure
- **244,084 pounds of steel** installed as reinforcing bar in concrete and for pedestrian bridges spanning two floodplain channels

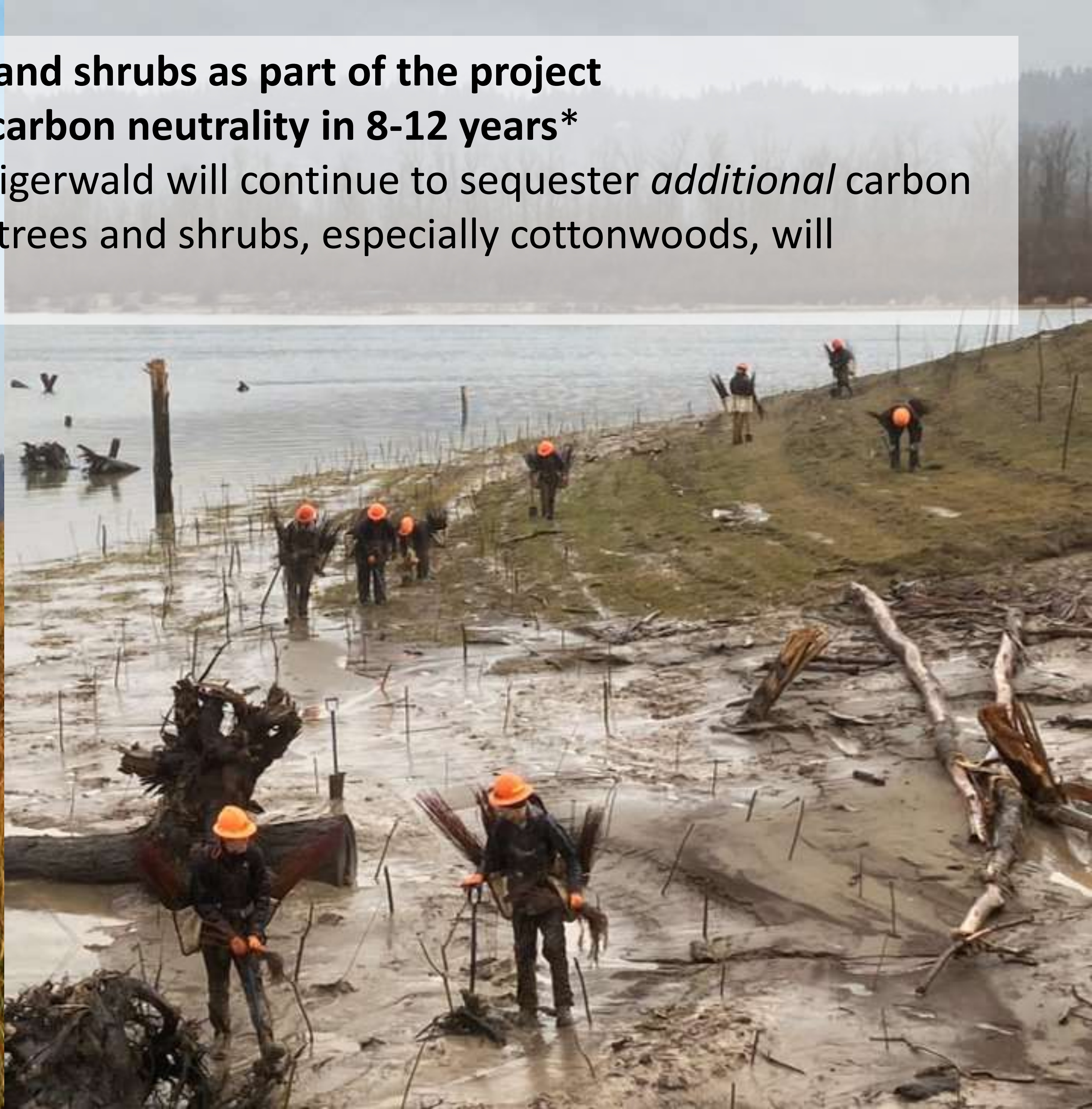
➢ ***Resulted in the release of @ 14,358,216 pounds of CO_2***

Steigerwald Example – *Carbon Intensive Infrastructure*

IMPACT	LBS CO_2
EARTHWORK	9,706,496
CONCRETE	4,068,360
STEEL	583,360
TOTAL	**14,358,216***

- ➢ *See Chris Collins' presentation this afternoon for more detail*

- **Planted over six hundred thousand trees and shrubs as part of the project**
- Preliminary analysis - project will **achieve carbon neutrality in 8-12 years***
- Beyond that, the planted vegetation at Steigerwald will continue to sequester *additional* carbon far into the future. Natural recruitment of trees and shrubs, especially cottonwoods, will sequester more carbon.



- *See Doug Kreuzer's presentation this afternoon*

Protect and Restore Natural and Working Lands with a Focus on Sequestering Carbon

- In 2019, carbon sequestered in **natural and working lands** reduced total GHG emissions in the United States by 12 % — U.S. Greenhouse Gas Inventory (EPA 2020).
- Researchers estimate that the amount of carbon sequestered annually could be **more than doubled** by **protecting and restoring natural habitats** and modifying **management practices on farms, forests, and rangelands** (Fargione et al 2018).
    - Regenerative practices that **focus on soil health** (reduced/no till, cover crops, crop diversity, rotational grazing, silvopasture) also effectively capture carbon (and reduce erosion, improve water retention)
- **Protect natural lands from conversion** - GHG emissions when natural lands are converted; not included within compensatory mitigation

Our New Challenge – Add Mitigation

All of us play an important part in avoiding the worst impacts of climate change

Our work in ecosystem restoration is critical – protecting and restoring natural and working lands can be climate smart, nature-based solutions

With some thoughtful changes in our techniques, we can be even more effective!

- Reduce project emissions where possible (e.g., minimize grading)
- Where not possible increase planting footprint

Share your ideas with restoration and resource management community!

Acknowledgements

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Questions?

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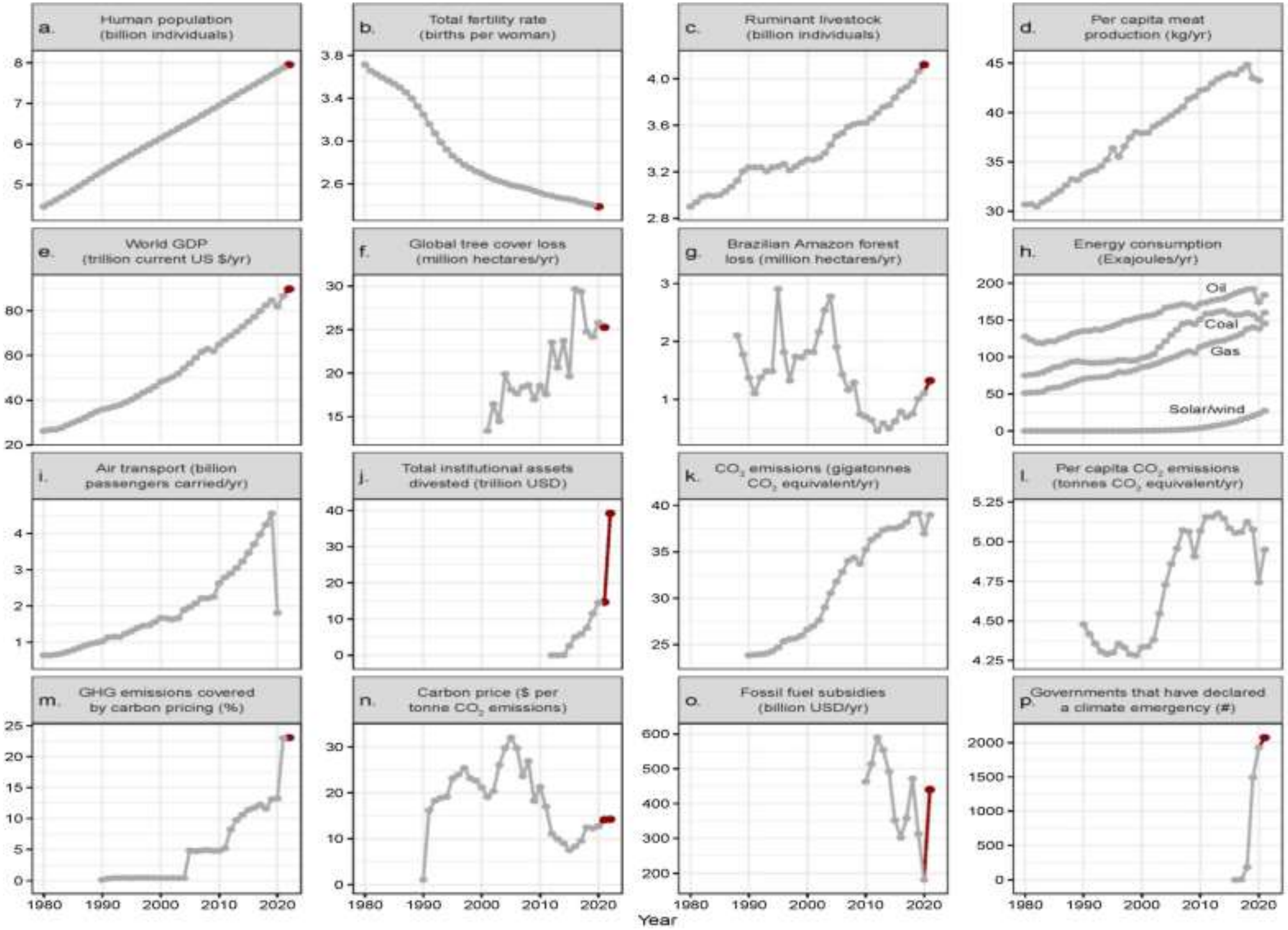
Because of the COVID-19 pandemic, global fossil fuel energy consumption decreased in 2020, along with carbon dioxide emissions and per capita carbon dioxide emissions. These declines were short-lived, and in 2021, all of these variables rose again. Although solar and wind power consumption increased by roughly 18% between 2020 and 2021, it is still approximately 18 times lower than fossil fuel consumption (Ripple et al. 2022)

Three major greenhouse gases—carbon dioxide, methane, and nitrous oxide—all set new records for atmospheric concentrations in 2022. In March 2022, carbon dioxide concentration reached 418 parts per million, the highest monthly global average concentration ever recorded. In addition, 2022 is on track to be one of the hottest years on record. Ocean heat content rose greatly in 2021 and is now at a record high (Ripple et al. 2022)

Time series of climate-related human activities. Data obtained since the publication of Ripple and colleagues (2021) are shown in red (dark gray in print). (Fig. 2, Ripple et al. 2022; reference below)



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