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EDITORIAL

Sustaining our common future: Transformative, timely, commons-based change is needed

With its 1987 report on *Our Common Future* (World Commission on Environment and Development, 1987), the World Commission on Environment and Development (WCED; also known as the Brundtland Commission) underscored an existential threat of our own making. Ironically, at the center of the threat is a human success—the creation of sudden, dramatic, and seemingly boundless economic growth (Figure 1).

A nearly 16-fold increase in per capita gross domestic product in barely a century counts, by most measures, as success. However, as the Brundtland report detailed, there are two serious flaws in the model: first, modernization along the lines fashioned in the last 120 years globally is environmentally hazardous on a scale unexperienced by the web of life; second, the model has maintained a global economic structure that is deeply unequal in its distribution of social security and self-governance, allowing endemic poverty amid historically unmatched prosperity. Both flaws have made and will continue to make our future unsustainable unless a significant change in course is undertaken according to the WCED.

In 1988, the World Meteorological Organization and the UN Environment Programme were able to win international support for the formation of the Intergovernmental Panel on Climate Change (IPCC). Issuing its first assessment in 1990, the Panel found clear scientific evidence of human-induced climate change (Intergovernmental Panel on Climate Change, 1990). The estimate of temperature change associated with human activity in the initial report would prove to be understated, and the report's projections through 2100 are now found to be lower than the “extremely likely” standard (> 95% probability) adopted by the IPCC in its Fourth Assessment Report (Intergovernmental Panel on Climate Change, 2007a). In fact, each assessment has determined the problem to be more extensive than the Panel's previous submission.

The 2018 IPCC Special Report (Intergovernmental Panel on Climate Change, 2018) has concluded that, even if the global community is able to keep temperature change below 1.5°–2.0°C by the end of the 21st century,¹ the impacts on global ecosystems are likely to be profound. Using terminology developed for the Third Assessment Report of Working Group II (Intergovernmental Panel on Climate Change, 2007b), the 2018 Report has highlighted significant risks in five areas, called “Reasons for Concern” or RFCs²:

- *unique or threatened systems* (including significant loss in biodiversity hotspots); *extreme events* (including heat waves and high-intensity storms);
- *unequal distribution of impacts* (especially, health, economic, and other social harms to low-latitude developing areas, which are the most vulnerable to climate change-related impacts);
- *aggregate economic impacts* (at temperature changes above 1.5°C, nearly all of humanity will experience adverse economic impacts);
- *large-scale “singularities”* that might trigger significant impacts throughout ecosystems (including deglaciation of the Greenland and West Antarctic ice sheets).

It reported risk probability ranges as follows:

“The risk transitions by degrees of global warming are now: from high to very high risk between 1.5°C and 2°C for RFC1 (Unique and threatened systems) (high confidence); from moderate to high risk between 1°C and 1.5°C for RFC2 (Extreme weather events) (medium confidence); from moderate to high risk between 1.5°C and 2°C for RFC3 (Distribution of impacts) (high confidence); from moderate to high risk between 1.5°C and 2.5°C

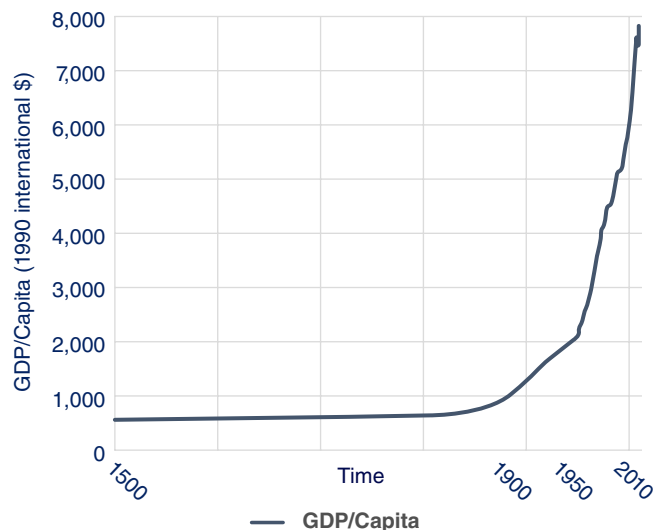


FIGURE 1 Modernization

Source: GDP and population: Maddison Historical Statistics. Maintained by Groningen Growth and Development Centre, University of Groningen. Measurement of economic growth by Angus Maddison. Retrieved from: <http://www.rug.nl/research/ggdc/data/maddison-historical-statistics>

for RFC4 (Global aggregate impacts) (medium confidence); and from moderate to high risk between 1°C and 2.5°C for RFC5 (Large-scale singular events) (medium confidence).”

With the 2018 Special Report, our existential threat has taken a new dimension: without *timely transformative changes* in the world's energy systems by mid-century, our energy-driven economy will endanger the viability of ecosystems to such an extent that human and all life will be compelled to face a future of risks that are beyond any that we have known. Using the best available scientific research, we have learned that we have roughly until the end of the century to demonstrate that we can decarbonize the global economy to preindustrial levels, and we have roughly 10–15 years to demonstrate that we can bend the carbon emissions curve downward in order to begin decarbonization in a timely enough manner to realize the end-of-century target. Figure 2 visualizes the definition of “timely transformation”: a near-zero per capita emission of CO₂—effectively repealing 20th to early 21st century carbonization.

Reminded that the WCED focused our attention not only on needed environmental but also social responses, decarbonization must include a process of creating economic parity and self-governance in its pursuit. As the 1987 Commission observed, international action is viable when, and only when, humanity sees the outcome as a *common future*. A key lesson from the extraordinary consensus recorded in the Paris Agreement (Paris Agreement, 2015) is that cooperation to decarbonize our way of life is feasible if (echoing the WCED) communities can expect economic fairness and self-governance paths of its pursuit.

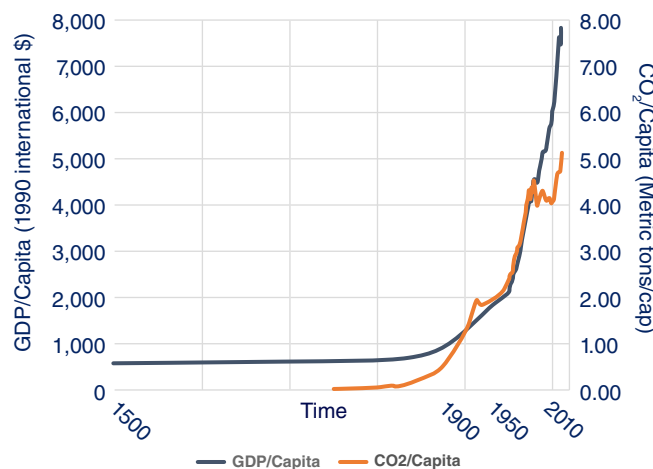


FIGURE 2 The climate conundrum of modernization

Source: GDP and population: Maddison Historical Statistics. Maintained by Groningen Growth and Development Centre, University of Groningen. Measurement of economic growth by Angus Maddison. Retrieved from: <http://www.rug.nl/research/ggdc/data/maddison-historical-statistics>. CO₂ emissions: Carbon Dioxide Information Analysis Center (CDIAC). Retrieved from: http://cdiac.ornl.gov/trends/emis/meth_reg.html

An interesting source of evidence for the necessity of commons-based action can be found in the release of Volume II of the Fourth U.S. National Climate Assessment by US Global Change Research Program (U.S. Global Change Research Program, 2018) where a panel of more than 300 scientists working in and beyond 13 U.S. federal agencies concluded that the United States faces hundreds of billions of dollars in annual damage losses for the remainder of the 21st century from unhindered climate change. Moreover, without *timely, transformative, common action* globally, the United States will face wildfires burning six times the area yearly that it currently experiences, incur premature deaths in the thousands per year, and be at risk of a host of viruses and other health threats for which inoculations are presently unavailable. In other words, even the most powerful society on earth cannot afford a go-it-alone policy posture of no global action (even though the current U.S. President and Republican Party espouse nonaction).

Our challenge is beyond any we have previously faced. An analogy can be drawn: consider the challenge to launch a human being into orbit around the earth and, importantly, return this person safely to earth. Once the space capsule is in orbit, we had to know the “go – no-go” point for its descent to begin. A wide array of sciences was enlisted to find the answer. Failure to know and act in timely recognition of the “go – no-go” point would end in tragedy. With the publication of the IPCC 2018 Special Report and the US Global Change Research Program's Fourth National Assessment, we now know the requirements of common, timely action to decarbonize the economy. Failure to act will result in unsustainability, with the consequences, shouldered disproportionately by those societies who have contributed the least to the climate crisis.³ The question for all of us has become: will we adopt a “stop” strategy to end our climate crisis or, will we succumb to fatalistic “will not stop” nonaction? Sustaining a worthy future depends on what we decide and do.

Throughout 2018, *Wiley Interdisciplinary Reviews: Energy and Environment* published reviews and focus articles on key topics to address the climate challenge and to provide new insights for better mitigation strategies. Examples of topics dealt with include: the question of bioenergy's environmental and socioeconomic benefits, including the debate about its climate neutrality, and demonstrating the complexity of defining and assessing the sustainability of biomass production (Mansuy, Barrette, Laganière, et al., 2018; Persson & Egnell, 2018).

Another highly important topic is the question of sustainable energy production in the emerging economies, which is essential in the climate equation due to their increasing economies and energy demand. Unless we find sustainable solutions for these countries and at the same time properly address the UN's Sustainable Development Goals, we will not be able to stop further warming. We issued a special collection of papers around this question, also addressing energy poverty. The potential of renewable energy sources in this part of the world could play a major role, demonstrated, for example, by a recent article on policy and potential analysis of Afghanistan, which has one of poorest rates of access to electricity in the world (Fahimi & Upham, 2018). Modern energy-planning tools for rural areas and developing countries, for example, web-based open-sources tools, could help these countries increase access to sustainable electricity and support planning of energy access policies (Moner-Girona et al., 2018). The markets for sustainable energy, for example, off-grid solar photovoltaics solutions, are too often still hampered by different barriers such as awareness, acceptance, and affordability (Muchunku, Ulsrud, Palit, & Jonker-Klunne, 2018). Along with the rapid development of clean energy technologies, the practical solutions typically used in developing countries also need updating, moving from small uses to larger applications, such as solar microgrid systems (Lemaire, 2018), which could substitute for grid connections.

In spite of the troubling situation with global emission trends compared to the required emission reductions, we see positive signals emerging. The development and deployment of renewable energy technologies, particularly solar and wind power, is accelerating and starting to make significant contributions in several markets (International Energy Agency, 2018). Such a trend will, however, evoke new challenges that will require our full attention in the coming years, such as how to ensure the functioning and reliability of the power system with increasing shares of variable renewable electricity and how to minimize the impacts on the environment and wildlife. Both themes are well covered by *Wiley Interdisciplinary Reviews: Energy and Environment* (see e.g., Meegahapola, Datta, Nutkani, & Conroy, 2018; Sinclair, Copping, May, et al., 2018).

As *Wiley Interdisciplinary Reviews: Energy and Environment* begins its eighth year, we ask the research community to work harder and dig deeper to understand and empower “stop” strategies to end our climate crisis.

We have a responsibility that cannot be ignored.

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ENDNOTES

¹There is currently no enforceable agreement among the parties to the UN Framework Convention on Climate Change to observe either ceiling in temperature change.

²The terminology used in the 2018 IPCC Special Report is based on language developed for the Third Assessment Report of Working Group II (Intergovernmental Panel on Climate Change, 2007b), first published in 2001.

³The presence and persistence of social disparity associated with a failure to act on the problem has been known for some time, as have the differentiated responsibilities of countries to act (Byrne, Wang, Lee, & Kim, 1998). See especially Table 1 and Figures 1 and 2. The ethical implications of nonaction have likewise been known for some time (Byrne, Glover, & Martinez, 2002).

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