



Report on Recent Reports #6, Winter 2023-2024*

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Abstract

The COP28 meeting in Dubai was a step forward, but the gap between what ought to be done to attain net zero emissions, and what is being done, may very well be widening. The 14 abstracts of authoritative multi-author reports collected here describe likely climate warming in the next decades (notably resulting in 26 potential Earth system tipping points), necessary transformative adaptations to mitigate warming (notably rethinking economics as if ecology mattered), an assessment of 14 potential “dead ends” leading to extinction of humanity, and a broad two-volume overview of existential risk studies.

1. Beyond COP28: Forecasts, Adaptations, and Polycrisis

The final agreement of the 2023 COP28 meeting in Dubai called on parties to transition away from fossil fuels to achieve net zero by 2050. Language calling for a phase-out or phase-down, favored by environmentalists and small island states, was rejected. As *The Economist* (Dec 16, 49-50) notes, “the final text is a product of bitter compromises between the desire to limit the planet’s warming and the economic interests aligned with fossil fuels.” Many of the deal’s provisions “leave much room for interpretation... (and) like all UN climate deals, there is no enforcement mechanism.” COP28 was a step forward, but the climate challenge appears to be widening the gap between achievements and needs—a perfect example of the “improvement but growing inadequacy paradox” (or IGI paradox).

The 14 foresight abstracts below are in three clusters: authoritative forecasts of what is likely in the next few decades, reports on necessary transformative adaptations, and two broader assessments of polycrisis and existential risk.

1.1. Forecasts

The latest Emissions Gap Report from UNEP (6:1) warns that, despite progress since 2015, we are headed for a temperature rise “far above the Paris Agreement,” as strongly suggested by the WMO’s decades-long assessment of “accelerating climate change” (6:1), which will

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undoubtedly continue in the 2020s. Top climate scientists argue that “overshooting 1.5°C is fast becoming inevitable” (6:2). The Rhodium Climate Outlook projects temperatures between 2.3°C and 3.4°C by 2100 (6:3). James Hansen *et al.* state that global warming will exceed 2.0°C before 2050 (6:4). In their worrisome survey of potential global tipping points, Timothy Lenton *et al.* (6:5) identify 26 potential Earth system tipping points that are likely at today’s 1.2°C warming (e.g. coral reefs, permafrost), at 1.5°C (e.g. boreal forest, mangroves), and at 2.0°C (e.g. ice sheet collapse). These forecasts should be taken very seriously at COP29, with counter-arguments invited. None are in sight.

1.2. Adaptations

To transform our world to sustainability, various interdisciplinary insights are needed for the SDGs (6:6). More specifically, UNEP *et al.* calls for repurposing the annual \$7 trillion in public and private capital flows into nature-negative activities such as fossil fuels (6:7). The Lancet Pathfinder Commission (6:8) argues that policies to mitigate climate change, often seen as negative, should emphasize the many health co-benefits. UNEP warns that cooling equipment demand due to global warming “will triple by 2050, resulting in a more than doubling of electricity consumption” (6:9), a variable that may have been overlooked by climate and energy forecasters. The Drought Resilience Alliance (6:10) estimates that 1.84 billion people are drought-stricken and proposes various actions. The IISD Earth Negotiations Bulletin (6:11) provides a lengthy guide to the “extremely complex issues” of climate change solutions. Equally complex, a World Economics Association Special Issue of RWER offers 23 essays on rethinking the discipline of economics as if ecology mattered (6:12).

1.3. Polycrisis

Beyond the immediate and visible problems of climate change, there are still other existential threats, also called a polycrisis, of nuclear weapons, biodiversity, pollution, rapidly spreading technologies such as AI, etc. A University of Stockholm team (6:13) identifies 14 dead ends where humanity could drive itself to extinction; 12 of them perhaps already in an advanced phase with hard-to-reverse lock-ons. In contrast to this technical article, the Center for the Study of Existential Risk at the University of Cambridge (6:14) offers a 300+ page introduction to existential risk studies for general audiences, followed by an anthology of major global risk articles.

[NOTE: 12 of the 14 items abstracted here were published in November or December 2023; 10 of these 12 appear to be timed for COP28 participants.]

RRR 6:1. Emissions Gap Report 2023: Broken Record—Temperatures Hit New Highs, Yet the World Fails to Cut Emissions (Again). UN Environment Programme, Nov 20 2023, 108p. The 14th annual edition “brings together many of the world’s top climate scientists to look at future trends.” Finds that “the world is heading for a temperature rise far above the Paris Agreement goals.” There has been progress since the goals were signed in 2015, when GHG emissions in 2030, based on policies in place, were expected to increase by 16%. The projected increase today is 3%. However, “GHG emissions still must fall by 28% for the 2°C pathway and 42% for the 1.5°C pathway.” The report looks at how more

robust implementation can improve the chances of bringing down emissions in 2035, and the potential risks of CO₂ removal methods. [ALSO SEE: **The Global Climate 2011-2020: A Decade of Accelerating Climate Change** (World Meteorological Organization, Dec 2023, 60p), noting that “each successive decade since the 1990s has been warmer than all previous decades,” with 2011-2020 as “the warmest decade on record by a clear margin for both land and ocean.”]

RRR 6:2. 10 New Insights in Climate Science. Future Earth, The Earth League, and The World Climate Research Programme, Dec 2023, 49p. An annual publication summarizing insights that were published between Jan 2022 and June 2023. 1) “Overshooting 1.5°C is fast becoming inevitable; minimizing the magnitude and duration of overshoot is essential”; 2) “No pathway remains that avoids exceeding 1.5°C global warming for at least some decades, except for truly radical transformations”; 3) Robust policies are needed to attain the scale needed for effective CO₂ removal; 4) Over-reliance on natural land and clean carbon sinks is a risky strategy; 5) Joint governance is needed to address the interlinked climate and biodiversity emergencies, e.g. ensuring that allocation of climate finance has nature-positive safeguards; 6) Compound events amplify climate risks and increase their uncertainty; 7) Mountain glacier loss is accelerating, threatening some 2 billion people downstream with water shortages; 8) Human immobility (inability or unwillingness to relocate) in climate risk areas is increasing; 9) New tools to seek justice enable more effective climate adaptation; 10) Food systems have a crucial role to play in climate action, with viable options from production to consumption.

RRR 6:3. Rhodium Climate Outlook: Probabilistic Projections of Energy Emissions and Global Temperature Rise. Kate Larson and 8 Others. Rhodium Group (Washington), Nov 30 2023, 29p. This initial RCO “addresses gaps left by existing global emissions and energy outlooks.” 1) We project likely temperature increases of 2.0 to 4.0°C by 2100, with a 2.3 to 3.4°C very likely range and a mean of 2.8°C; 2) The world has made progress in decarbonizing electricity and vehicles, such that emissions will decline through mid-century, but momentum in power and transport bottoms out afterwards, “as demand for more power and transportation continues to increase”; without ongoing support for storage, and advanced geothermal and nuclear, fossil fuels hang on and even expand; 3) we see a >50% chance that emissions from the industrial sector will rise over the coming decades as demand for industrial products (steel, cement, chemicals) grows; 4) Global fossil fuel consumption is likely to peak this decade, but the decline plateaus after 2060, and remains at >60% of today’s levels; 5) Keeping global temperature increase below 2°C will require mature clean energy technologies in all regions, and a significant decline in their costs.

RRR 6:4. “Global Warming in the Pipeline,” James E. Hansen and 17 Others, *Oxford Open Climate Change*, 3:1, Nov 2, 2023. Analysis of equilibrium global warming as a result of the decline of human-made aerosol emissions since 2010, “which should increase the 1970-2010 global warming rate of 0.18°C per decade to a post-2010 rate of at least 0.27°C per decade. Thus, under the present geopolitical approach to GHG emissions, “*global warming will exceed 1.5°C in the 2020s and 2.0°C before 2050. Impacts on people and nature will accelerate as global warming increases hydrologic (weather) extremes.*” Required actions

include a global increasing price on GHG emissions, abundant and affordable clean energy, East-West cooperation to accommodate developing world needs, and a phase-down of “today’s massive human-made ‘geo-transformation’ of Earth’s climate.” [NOTE: The lead author is associated with the [Earth Institute](#) at Columbia University and is widely known for his 1988 testimony to the US Congress on dangerous climate change.]

“An annual US\$7 trillion in public and private capital flows into nature-negative activities in sectors including fossil fuels, agriculture and construction. Only US\$200 billion per year goes towards nature-based solutions.”

RRR 6:5 Global Tipping Points Report 2023. Timothy M. Lenton and 18 Others. University of Exeter Global Systems Initiative, Dec 2023, 478p; 32p Summary. Funded by the Bezos Earth Fund, this report launched at COP28 draws on work by >200 scientists and includes 109 pages of references. *“Harmful tipping points in the natural world pose some of the gravest threats faced by humanity. Their triggering will severely damage our planet’s life-support systems and threaten the stability of our cities”*. More than 25 Earth system tipping points have been identified: 6 in the cryosphere (e.g. the Greenland and West Antarctic ice sheets, dryland degradation, permafrost thaw), 16 in the biosphere (the Amazon and other forest dieback, coral reef die-off, mangroves, fishery collapse), and 4 ocean and atmosphere circulations (Atlantic Meridional Overturning Circulation/AMOC, the North Atlantic Subpolar Gyre/SPG, the Southern Ocean Overturning Circulation, and the West African monsoon).

At today’s 1.2°C warming, warm-water coral reefs are likely tipping, and “four other systems may pass tipping points”: the Greenland and West Antarctic ice sheets, the SPG, and parts of the permafrost. Passing 1.5°C warming, widespread mortality in coral reefs is very likely, and potential tipping systems become vulnerable for boreal forests, mangroves, and seagrass meadows. At 2°C warming, the Greenland and West Antarctic ice sheets will likely collapse. “Negative tipping points show that the threat posed by the climate and ecological crisis is far more severe than is commonly understood.” The total damage will be far more significant than the initial impacts, as effects cascade through social and economic systems and could exceed the ability of some countries to adapt.

“The world is on a disastrous trajectory.” There is no adequate global governance given the scale of the threats posed. Threats in the coming days could be catastrophic, including a global loss of capacity to grow major staple crops. Crossing one harmful tipping point could trigger others, causing a domino effect of accelerating change. “Prevention is only possible if societies and economic systems are transformed to rapidly reduce emissions and restore nature.” Incremental change is no longer an option. “Crucial to achieving this transformational change are positive tipping point opportunities, such as the accelerating

rollout of electric vehicles.” [NOTE: Warnings of negative tipping points in the natural world are crucial, and hopes of “triggering positive tipping points” cannot be overlooked.] However, no mention is made of negative tipping points in society, notably the COVID-19 pandemic and ugly wars in Ukraine and Gaza, diverting vast sums of money that could be spent for positive mitigation and adaptation. ALSO SEE: “Reframing the Threat of Global Warming: An Empirical Global Loop Diagram of Climate Change, Food Insecurity and Societal Collapse,” C. E. Richards *et al.*, *Climatic Change* 164, Feb 19, 2021, on “increasing concern that climate change poses an existential threat to humanity.”

RRR 6:6. Transforming Our World: Interdisciplinary Insights on the Sustainable Development Goals. SDSN Europe, June 2023, 125p. The third report of the SDSN Senior Work Group on the European Green Deal, chaired by Jeffrey Sachs and Phoebe Koundouri, notes that today’s world stands at the crossroads of significant global challenges, which underscores “the essential role of sustainable development in forging a prosperous, equitable, and peaceful future for all.” Each chapter highlights significant considerations for driving sustainable development and achieving the SDGs. 1) The EU’s opportunity to redefine the landscape of global sustainable development challenges (the EU Green Deal is a key part of addressing externalities like deforestation and leveraging interconnected networks); 2) Private sector funding of the SDGs (on the increasing engagement from the finance industry—still small compared to the total capital required; challenges include competing demands on global capital, macro-headwinds repricing assets, the prevalence of greenwashing, and political backlash against ESG and sustainable investing); 3) Strong ESG momentum in international equity returns (on calculating the SDG footprint of a portfolio); 4) Interconnections of natural capital, social capital, produced capital, and cultural heritage in sustainable development; 5) Carbon farming and voluntary carbon markets (VCMs) in the EU (VCM efforts should focus on nature-based solutions); 6) The potential of green jobs and digital transition (on tracking energy employment to ensure good quality jobs, the greater percentage of high-skilled workers in the energy sector compared to other industries, and projections of energy employment in 2030); 7) Eco-anxiety and perception about governments (both have positive impacts on personal environmental responsibility; better communication about climate risks can encourage people to take more responsibility for eco-friendly actions). [ALSO SEE: the [SDG Transformation Center](#), recently initiated by the [Sustainable Development Solutions Network](#) to support their proposed “Six Transformations” on universal quality education, universal health coverage, zero-carbon energy systems, sustainable agriculture and ecosystems, sustainable cities, and universal digital access and services.]

RRR 6:7. State of Finance for Nature: The Big Nature Turnaround Repurposing \$7 Trillion to Combat Nature Loss. UN Environment Programme, Global Canopy, and The Economics of Land Degradation, Dec 2023, 74p. Nature is the heart of human well-being and prosperity, yet “*the triple planetary crisis*”—climate change, biodiversity loss, and pollution/waste—is causing nature to atrophy. “This looming existential crisis puts humanity at a crossroads.” Despite biodiversity agreements, “governments continue to provide subsidies and tax rebates to economic activities that drive the triple planetary crisis and deplete natural capital.” This 3rd edition of the State of Finance for Nature shows that “*an annual*

US\$7 trillion in public and private capital flows into nature-negative activities in sectors including fossil fuels, agriculture and construction. Only US\$200 billion per year goes towards nature-based solutions". The \$7 trillion figure is likely to be an underestimate in that it includes only direct impacts. These numbers must be flipped to promote a stable climate, healthy land, and nature. Nature-based solutions are cost-effective and provide multiple benefits; in contrast, 75% of the energy consumed still comes from fossil fuels, and 37% of the global land area is used for agriculture—one of the most significant drivers of biodiversity loss. Up to 40% of the planet's land is degraded, impacting half of the human population; 95% of land could be degraded by 2050.

"The worst threats to humanity are no longer 'natural' ones; they are caused (or at least aggravated) by us."

RRR 6:8. Pathways to a Healthy Net-Zero Future: The Lancet Pathfinder Commission Report. Lancet Pathfinder Commission, *The Lancet*, Nov 21 2023, 13p Summary. The world is heating alarmingly, and the WHO describes climate change as the greatest threat to human health. Despite growing awareness of this challenge, *"actions are not being implemented at the rate or scale needed to avoid disaster."* The effects of policies needed to mitigate climate change are often presented as negative, but many of the interventions advocated bring an additional and positive benefit to better health. Emphasis on these health co-benefits (reduced air pollution, healthier diets, increased physical activity) can be a powerful incentive for more ambitious climate action. "Examples of implemented and evaluated transformative action are needed to inspire and inform change," with more emphasis on the health effects of mitigation actions. Partners of the Commission's first phase include the [C40 Cities](#) network, the [OECD](#), [CDP](#), [SDSN](#), and the Alliance for Health Policy and Systems Research. The next phase of this Initiative will develop a coalition of partners committed to ambitious action.

RRR 6:9. Keeping It Chill: How to Meet Cooling Demand While Cutting Emissions. [UN Environment Programme](#), Dec 2023, 121p. "As the world warms and as incomes and populations grow, demand for cooling is rapidly growing." Based on current policies, *"installed capacity of cooling equipment globally will triple by 2050, resulting in a more than doubling of electricity consumption."* This rapid increase will strain electricity grids in many countries, presenting a significant hurdle to the transition to renewable energy. In addition to emissions from electricity consumption, there are emissions from the release of refrigerant gases in cooling equipment, most of which have a higher global warming potential than CO₂. Chapters describe the urgent need for sustainable cooling ("one of the biggest opportunities to protect people, prosperity and the planet"), the pathway to near-zero emissions from cooling, the landscape of national cooling policies (regulatory instruments, capacity planning, market readiness for sustainable solutions), space cooling (an integrated whole-systems approach, technological innovation, overcoming barriers), refrigeration and cold chains, and low-emission refrigerants. [NOTE: The Cool Coalition led by UNEP prepared this "Global Cooling Watch 2023" report and, for the first time, undertakes modelling of the totality of direct and indirect emissions from cooling while considering cooling access needs. Reducing health risks is not mentioned, except in passing, but it is an obvious benefit.]

RRR 6:10. Global Drought Snapshot 2023: The Need for Proactive Action. International Drought Resilience Alliance, *UN Convention to Combat Desertification*, and United for Land, Dec 2023, 40p. Based on data from 101 county Parties to the UNCCD, “1.84 billion people are drought-stricken, of which 4.7% are exposed to severe or extreme drought.” Drought impacts are on the rise. Drought creates forced migration, causes famine, primarily affects women and children (and the poorest), and has cascading effects on ecological systems. The report describes false facts and fake solutions, options on the table, anecdotal hope for restoration and resilience, and the scale of needed commitment. Figures illustrate the global drought vulnerability index, drought hotspots, the case for proactive investment, holistic drought engagement’s four pillars, global paradoxes of wealth disparities, and military vs. environmental spending.

RRR 6:11. “On Behalf of My Delegation...” A Survival Guide for New and Lonely Climate Change Negotiators. IISD Earth Negotiations Bulletin, Second Edition, Dec 2023, 156p. The ENB is a project of the International Institute for Sustainable Development, with a staff of >200 and offices in Winnipeg, Geneva, Ottawa, and Toronto. The Bulletin, founded in 1992, is an independent reporting service on UN environmental and development negotiations. ENB works “to accelerate solutions for a stable climate, sustainable resource management, and fair economies. Our work inspires better decisions and sparks meaningful action to help people and the planet thrive.” This guide pays tribute to negotiators worldwide, especially from the Global South, who negotiate extremely complex climate change issues and are too often expected to learn on the fly. Chapters describe the climate change problem (the science, the impacts, mitigation and adaptation, loss and damage), evolution of the international climate regime (UNFCCC 1992, the Kyoto Protocol, the Paris Agreement), bodies in the regime, the rules of procedure, state and non-state actors, coalitions in the regime (divisions with and among groups), the G-77 and China, the ideal negotiator (preparations, positions, bargaining), the disadvantaged negotiator, and coping strategies (filling a hollow mandate, drafting, submitting, speaking, reaching closure). [NOTE: Hardly time for anyone at COP28 to digest, but likely to be very valuable for any negotiator at COP29 in Azerbaijan, and for anyone else who wishes to understand the complexities of these annual meetings.]

RRR 6:12 “How Can We Construct an Economics Consistent with the Biophysical Limits to Economic Growth?” World Economics Association, *Real-World Economics Review 106*, Special Issue, Dec 2023, 196p. The invitation to contribute views climate change “in an accelerating phase” and calls the title of the issue “a far bigger question than economists have ever addressed...it requires revisiting our discipline’s foundations.” The 23 essays that follow address economics as if ecology mattered (in this critical moment to reflect on what is at stake), an economic theory compatible with life processes and physical laws, six kinds of capital required for a healthy economy (financial, produced, natural, human, social, and systems), an economics of deep transformations (“holistic and interdisciplinary”), will economics ever become more ecological (60 years on from “The Limits to Growth”), putting energy back into economics, getting the concept of time suitable for Economics 101, adopting “complexity” in economics to resolve dilemmas in the Anthropocene, a new understanding of the modern division of labor, complex economies in the biosphere with the

commons restored, overcoming speciesism in economics, challenges of living in reciprocity with nature, the need to adopt a realist global political economy and a futures approach, economics of abundance with degrowth, livability within planetary limits, demographics and the economy, etc. [NOTE: Ecological economists at leading universities extensively describe an economics relevant for the real-world 21st century, but the “How” of communicating with and changing mainstream economics is ignored].

RRR 6:13. “Evolution of the Polycrisis: Anthropocene Traps that Challenge Global Sustainability,” Peter Søgaard Jørgensen (Stockholm Resilience Centre) and 12 Others, *Philosophical Transactions of the Royal Society B (Biological Sciences)* 379, Nov 13, 2023. The Anthropocene is characterized by accelerating change and global challenges of increasing complexity, what some have called a polycrisis. However, can this trajectory become a trap for humanity? A team from the University of Stockholm identifies 14 dead ends where humanity could drive itself to extinction. GLOBAL (5): over-simplification where systems are too specialized to adapt, non-stop pursuit of growth that harms well-being, overshoot using more than Earth can provide, international conflict, and infectious diseases; TECHNOLOGY (5): infrastructure lock-in (e.g., fossil fuels), chemical pollution, existential technology (e.g., nuclear arms), technological autonomy (AI), and dis/misinformation; STRUCTURAL (4): short-termism, overconsumption, biosphere disconnect, local social capital loss by a digital world. Ten of these traps have growing trends in their indicators; 12 may be in an advanced phase with hard-to-reverse lock-ons and a growing risk of negative impacts on human well-being. These traps often reinforce each other and rarely act in a dampening fashion.

RRR 6:14 The Era of Global Risk. Vol 1: An Introduction to Existential Risk Studies. Edited by SJ Beard, Martin Rees, Catherine Richards, and Clarissa Rios Rojas (all [Centre for the Study of Existential Risk](#), Univ of Cambridge). Open Book Publishing, Fall 2023, 333p. **Vol 2: An Anthology of Global Risk**, edited by SJ Beard and Tom Hobson, Forthcoming. “This innovative and comprehensive collection of essays explores the biggest threats facing humanity in the 21st century; threats that... have the potential to bring about human extinction and civilization collapse.” Experts from many disciplines describe how we can understand these threats better, and “what can be done to manage them effectively.” Ten chapters discuss the history of existential risk and those who worked to mitigate it, theories and models predicting societal collapse, existential risk and science governance, global justice and global catastrophic risk, enabling everyone to reduce existential risk, natural global catastrophic risks, ecological breakdown and human extinction, minimizing potential harms in an age of biotechnology, a history of AI existential safety, and military AI as a contributor to global catastrophic risk. In the Preface, Martin Rees, the UK Astronomer Royal and co-founder of CSER in 2013, notes that “The Earth has existed for 45 million centuries, but this is the first century in which one dominant species—ours—can determine, for good or ill, the future of the entire biosphere... The worst threats to humanity are no longer ‘natural’ ones; they are caused (or at least aggravated) by us.” [ALSO SEE: [New European Voices on Existential Risk \(NEVER\)](#), a project convened by the [European Leadership Network](#) in Aug 2023 with 36 members on nuclear issues, climate change, biosecurity, and emerging disruptive technologies.]

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(Some titles have been abbreviated)

1. Beard, SJ, Martin Rees, Catherine Richards, and Clarissa Rios Rojas, eds. (see CSER, Cambridge, 6:14)
2. Centre for the Study of Existential Risk, University of Cambridge, **The Era of Global Risk. Vol 1: An Introduction to Existential Risk Studies** (Fall 2023, 333p); **Vol 2: An Anthology of Global Risk [6:14]**
3. Earth League (see Future Earth, 6:2)
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8. Global Systems Initiative, University of Exeter, **Global Tipping Points Report 2023** (Dec 2023, 478p) **[6:5]**
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12. Jørgensen, Peter Søgaard and 12 Others (see Stockholm Resilience Centre, 6:13)
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20. Sustainable Development Solutions Network (see SDSN Europe, 6:6)
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28. World Meteorological Organization, **The Global Climate 2011-2020: A Decade of Accelerating Climate Change** (Dec 2023, 60p) [6:1 Also See]

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