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Cadmus

Promoting Leadership in Thought that Leads to Action

Volume 4, Issue 5 - November 2021

No More Excuses! Why the Climate and Ecological Emergencies Demand a New Paradigm

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Abstract

In this paper we reprise some of the themes set out in our recent special issue of Globalizations, which explores the contributing role of mainstream economics in the current climate emergency. We provide a brief update on the current state of the declared 'climate emergency' and we make the case for a paradigm shift informed by quite different principles, including 'transversalism'.

"Gimme spots on the apples, but leave me the birds and bees…"

– Joni Mitchell

1. Introduction

In our view, it is strategically vital to 'overturn' the dominant conventional wisdom in the mainstream paradigm in the field of economics and to actively collaborate to create and propagate a radically different paradigm and deploy a new standard curriculum for the teaching of the field. Such a claim is not new—similar claims have been made for a variety of reasons in the pages of this journal (e.g. Jacobs et al., 2017). Our current claim, however, is more specifically motivated by the present ongoing and accelerating planetary crises of climate change and ecological or biophysical breakdown, involving global heating, species extinction, and numerous other adverse outcomes (e.g. Ripple 2021a, 2021b). This combination of crises compels us to make a radical departure from the existing dominant paradigm(s) and to actively work for the creation and realisation of a new transformative paradigm.

Intrinsic to this call then, is the aim to critique the dominant mainstream economics paradigm, to expose its function as a causal driver of the planetary crises of global climate emergency and ecological breakdown (Gills and Morgan, 2020a). In pursuit of this goal we have recently organised a project in which we invited a number of economists, other social scientists, and

* The authors would like to confirm that they are joint and equal co-authors of this article. Some of the material is drawn from the previously published, Barry Gills and Jamie Morgan (2021), 'Editorial Postscript: An End to the War on Nature: COP in or COP out?' *Globalizations*, 18 (7).

expert activists to contribute critiques of mainstream economics and to explore associated issues.* There is a variety of terminology that refers to and is used to categorise mainstream economics and a great deal of literature which seeks to account for key characteristics of the field, how it develops, and for the limits to its diversity, but the core of this mainstream is often referred to loosely by the term neoclassical economics and typically associated currently with neoliberalism. While there is always scope to discuss the adequacy of concepts and there is a great deal of dispute regarding the meaning of terms like neoclassical and neoliberal, we would suggest the terms are sufficiently associated with theory and practice that have helped to create the world in which we live for them to stand as rough and ready reference points for key characteristics of contemporary theory and practice that we must move beyond if our species is to survive and flourish.† The following are by no means original and many will be familiar to interested parties in one way or another:

1. The new paradigm must embody a profoundly different understanding of what constitutes 'wealth creation' and human well-being.

2. It must rethink the way needs are met through different 'satisfiers' operating within a differently conceived 'provisioning' system—a system that overturns the current tacit situation in which we live to 'keep the economy going and growing' rather than the economy exists to serve our needs. It must encourage a concept of 'enough' and distinguish consumption from consumerism and reconcile use value and exchange value.

3. It must radically alter how we conceive and how we act in regard of how we conceive our place in the world as a species—a metaphorical and structural switch from 'empty world' to 'full world' thinking, from profligate prairie 'cowboy' to 'spaceship Earth', from Master to steward, from 'on' to 'within and with', a form of thinking that looks to nurture, preserve and harmonise more than it extracts and destroys (to add yet another metaphor, no longer holing the boat in which we float)…

4. It must be a paradigm that fully respects the parameters of what is necessary to live on this planet without destroying the basis for future social well-being, peace, and security. It must be a paradigm that values human well-being above gross material production.

5. It must move beyond the contemporary dominance of capital accumulation.

6. It must move beyond an incentive system built around bottom lines, profit at all costs, and corporate greed in the name of shareholder value.

7. It must break the chains of overriding corporate interest: constraints which capture states and policy discourse, constraints which feed and are fed by a financialized system in which money comes from debt, and finance acts as inequality-enhancing, bubble-forming, asset-expanding fuel for, rather than lubricant of the economy.

* The list of included contributions in the special issue volume 18 issue 7, 2021 of *Globalizations* includes (in order and as dated from online publication): Gills and Morgan (2020b); Spash (2020a); Hickel (2020a); Trainer (2021); Galbraith (2020); Spash (2020b); Keen (2020); Asefi-Najafabady et al. (2020); Gills and Morgan (2020c); Bacevic (2020); Koch and Buch-Hansen (2020); Dale (2020); Fox and Alldred (2020); Goodman and Anderson (2020); Egmose et al. (2021); Franco and Borras Jr. (2021) and Steffen and Morgan (2021).

† For those interested in debates regarding adequacy of concepts and their relevance see e.g., Venugopal (2015); Bruff and Tansel (2019); Jessop and Morgan (2021).

8. It must move beyond the centrality of economic growth and the conventional measurement of GDP, and embrace post-growth, degrowth, and social-ecological economics perspectives.

"Mainstream economics has little time for discussion of values or of its own role in the world because its concept of science has undermined the capacity of economists to reflect and work with norms and with power – these are shunned as 'ideological', as 'distortions' of a fact focused science."

These are not substantive elements of a curriculum or of how it should be taught, but rather orienting issues and principles. For a mainstream economist much of this will seem beside the point, cosmic, utopian, someone else's problem—but that is precisely part of the problem. Economics has become a universal toolkit, behind which sits a framework of theory and attitudes which constitute 'thinking like an economist'. This has involved implicit values and policy preferences and a whole set of omissions and commissions with adverse consequences—not least economics' role in facilitating our descent into climate emergency. And yet mainstream economics has little time for discussion of values or of its own role in the world because its concept of science has undermined the capacity of economists to reflect and work with norms and with power—these are shunned as 'ideological', as 'distortions' of a fact-focused science. But as the list above indicates (if one pays attention to its contrasted claims) and as readers are perhaps aware—mainstream economics is built around the theory of the circular flow of income and measuring exchange values in a pricing system (the aggregate of which is GDP) and material consequences and processes play little to no direct role in its theory and thus in its policy relevance. Consider what that means, the dominant theory-form and the most influential source of social science policy on the planet has no foundational regard for the planet—this is merely subsumed in pricing processes or tagged on via environmental economics.

As such, mainstream economics is a theory of the most material aspect of human activity (the economy) with no *binding measurement* of what an economy really is and really does. This raises deep questions regarding mainstream economics status as a fact-focused science, since this is the equivalent of cosmology having no interest in gravity. From this point of view economics has become the most aberrant of contemporary social sciences and this too demands a paradigm shift, but one which some social theorists suggest speaks to a problem across the social sciences. Andrew Sayer puts this best:

> It seems that becoming a social scientist involves learning to adopt this distanced relation to social life, perhaps so as to be more objective as if we could be more objective by ignoring part of the object… Values and objectivity need not be inversely related. For many social scientists, assessing well-being

> is a step too far, a dangerous importation of the researcher's own values. But well-being and ill-being are indeed states of being, not merely subjective value-judgments… The very assumption that judgments of value and objectivity don't mix—an assumption that is sometimes built into the definition of "objectivity"—is a misconception… How people can live together is not merely a matter of coordination of the actions of different individuals by means of conventions, like deciding which side of the road to drive on, but a matter of considering people's capacities for flourishing and susceptibilities to harm and suffering… I have often encountered the strange idea that values are not only subjective but synonymous with "bias" or distortion. It is further assumed that they are personal biases that one ideally should confess to, so that others will at least be able to "take them into account", that is, *discount* them… As social scientific spectators we tend to talk about behaviour in terms of what *explains* it, usually by reference to existing circumstances and meanings, but as participants, we tend to *justify* what we do, and implicitly invite others to accept or reject our justification. (Sayer, 2011: 6-11)

"The new paradigm must create a workable framework to ensure future peace and security for all of humanity and the perpetuation of the ecosystems and myriad other species upon which human life depends."

Sayer's point is that social science needs to reconcile a whole set of false binaries and remember what the point of social science is—to help others think about what it means for our species to flourish not merely to measure a set of metrics and state a set of regularities that constitute what it is that we currently do. As such we would also add to our list in the light of climate and ecological breakdown:

9. The idea of progress must be philosophically and culturally redefined to embody post-materialistic aspirations and meaning as primary for human flourishing.

And because climate and ecological breakdown are global problems:

10. The new paradigm must create a workable framework to ensure future peace and security for *all* of humanity and the perpetuation of the ecosystems and myriad other species upon which human life depends.

Our claim then is that we need a new paradigm that connects all aspects of systems and understands that objectivity is not impartiality. Reality is not just interesting: we have an interest in reality and what we value manifestly affects both the planet and ourselves. At the moment that interest extends to an existential imperative—creating a paradigm of social transformation that guarantees a human future not condemned to perpetual acute crises of environmental and social breakdown and collapse. As we have already noted, this

new paradigm should reflect whole systems thinking, respect the insights and empirical information derived from contemporary Earth system science, and definitively abandon the false dichotomies of the separation of politics from economics and humanity from 'nature' (Biermann, 2021). There is no scope here to discuss all aspects of this subject, so in what follows we will provide some flavour of our thinking, and would urge you to read the collected essays and the sources they draw on. We begin with a review of the significance of recent climate science and why it compels us to renew our call for urgent radical transformative action and end with a discussion of 'transversalism' (Gills and Morgan, 2020a; Gills, 2020; Gills and Hosseini, 2021).

2. The consequences of complacency and delay: what once was a problem for the future has become an urgent problem for the now

As the classic hockey stick graph of GDP highlights, the first industrial revolution radically changed economic output and this industrialisation created a whole new order of resource and carbon-dependent energy use, beginning with coal (see Newell, 2021). Subsequent industrial revolutions (electrical, chemical, digital) built upon this; as economies developed, they also diversified and through various socio-economic processes developed consumerism as a key component of the economy—creating a mutually dependent source of growth, identity, and aspiration. This resource and energy-hungry complex has gradually spread from place to place, and especially so in the last 50 years. However one historicizes contemporary 'globalization', there are more of us and more of us living lives of a kind we did not before or servicing those who do, since only a fraction of the world's population experience the kind of lifestyles that the spread of industrialisation and consumption offers as its aspirational ideal.

It is entirely explicable then that this 'great acceleration' (McNeill, 2001) has massively increased the demands we place on the planet—such that our species and its dominant system now define a post-Holocene epoch (the Anthropocene for some, the 'capitalocene' for others—see Moore, 2015). The cumulative consequences have been sufficiently obvious through the last 50 years to induce various organisations to address those consequences: the UNEP in 1972, the various UN Earth Summits since 1992 (following the creation of Earth Day in 1970 and also the work of the UN World Commission in 1987 on 'sustainable development') and, of course, the UNFCCC in 1992 and the subsequent Conference Of the Parties (COP) process to address climate change—of which COP26 in Glasgow is the latest in 2021. Across this period a contrast has developed between the adverse consequences of 'business as usual' and a different more viable way forward, and yet throughout there have been numerous state and corporate-led attempts to prevent significant change across numerous fronts (Oreskes and Conway, 2010; Lamb et al., 2020): questioning the science, questioning the need for urgent action, counselling delay, arguing that problems will essentially take care of themselves (as company investment and consumer behaviour adjust) with some minor steering from global organization and individual governments.

As our special issue of *Globalizations* makes clear, mainstream economics has been part of this problem rather than a source of solutions. Delay has continued sufficiently long now

for a problem for the future to become an urgent problem for the now, and this is across multiple fronts. The UNEP, COP etc. notwithstanding, it used to be considered 'alarmist' to refer to 'business as usual' as an existential problem, but this is no longer the case and reference to the potential for a 'mass extinction' event and 'civilizational collapse' by the end of this century if we do not act commensurate to the problems that now are beginning to manifest has become common media currency (for the background on biodiversity loss and a sixth mass extinction see Bradshaw et al., 2021).

Most Earth systems operate according to multi-faceted interactions of parts in a system, where that system has emergent properties that endure for very long periods. This is 'complexity' as a rough tendency for reproduction or stabilisation of some complicated process—weather patterns and parameters within climate systems etc.—and this is dependent on a balance between positive feedback processes (self-augmenting changes) and negative feedback (self-dampening changes). Human intervention can disrupt these processes in numerous ways—adding or extracting chemicals, removing species, modifying land and seascapes—leading to a combination of anthropogenic 'forcing' factors, destructions and disruptions. The more pervasive we become the more our impact is felt, the longer our activity continues the greater the cumulative consequence and the more possibility of a breakdown of systems and also transition of states of systems—and this is very important since the Holocene was an unusually benign period over the last 12,000 years or so. Consider then:

- In 1900 the world's population was about 1.6 billion and global GDP was estimated at $1.1 trillion, while in 2020 global population approached 7.8 billion and GDP stood at about $85 trillion (a reduction from over $87 trillion in 2019 due to the effects of COVID-19).
- According to a special report from the IPCC, 70% of ice-free land surface is now directly affected by human use (IPCC, 2019).
- Our rate of resource use has already exceeded the regenerative capacity of the Earth (Earth 'overshoot' day was July 29th in 2021, two months *earlier* than twenty years previously and our current activity requires more than 1.7 Earths in this context).*
- Volume atmospheric carbon dioxide (CO_2) concentration has increased from an average 280 parts per million (ppm) at the beginning of the industrial revolution to 417ppm in 2021 (approaching levels not seen in 3.6 million years). It took around 200 years for the 280ppm figure to increase by around 25% but just the last 30 years for it to increase by about 50%.
- According to research sponsored by Oxfam, the current situation of resource exhaustion and climate emergency reflects deep inequalities. Between 1995 and 2015: 'The richest 10% of the world's population (c.630 million people) were responsible for 52% of the cumulative carbon emissions—depleting the global carbon budget by nearly a third (31%) in those 25 years alone; The poorest 50% (c.3.1 billion people) were responsible

* Note there is some dispute regarding the modelling of data for this metric but most of the criticism tends to argue that the approach underestimates rather than overestimates the problem.

> for just 7% of cumulative emissions, and used just 4% of the available carbon budget; The richest 1% (c.63 million people) alone were responsible for 15% of cumulative emissions, and 9% of the carbon budget—twice as much as the poorest half of the world's population' (Gore, 2020: 2).

There are numerous similar statistics covering a whole array of related aspects of life on Earth. In any case, we have in recent years witnessed an intensification and acceleration of the conjoint crises of global climate change and ecological breakdown or 'biosphere degradation'. According to work by Earth system scientists, over the last two decades or so the 'safe operating space' of 3, then 4, and now likely 6 out of 9 components of Earth systems have been transgressed, of which the best known is the climate system and the effects of greenhouse gases (Steffen and Morgan, 2021).*

3. Climate Emergency Update

A main focus of climate science is the relation between carbon emissions and changes in average global surface temperature and this is typically defined using 'climate sensitivity', i.e. the increase in temperature per doubling of atmospheric CO_2 (from the preindustrial benchmark of 280ppm to 560ppm). The Earth is an 'open system' of conditional relations between many parts so the resultant level of heating is contingent—until recently estimates usually placed this between 1.5 ^{0}C to 4.5 ^{0}C per doubling, but more recent consensus raises and narrows this to the lower decimal end of 2 ^{0}C and upper decimal end of 3 ^{0}C as processes feed through systems and the derivation of this and the upper bound is now hotly debated in climate science, insofar as the effects may be even higher (see Sherwood et al., 2020). Temperature has already increased by 1.1 ^{0}C-1.3 ^{0}C depending on measure and dataset used, and to be clear, this is average temperature *not* weather—average temperature affects climate systems and thus weather patterns, in turn affecting the range of temperatures, levels of water vapour, cloud cover and thus further processes, such as patterns and intensity of rainfall and wind speeds. This then feeds through other processes—carbon capture by forests varying by growing season, ocean absorption etc. and it should be noted that emissions occurring now can take hundreds and thousands of years to work their way through—even if we stopped emitting now the processes of heating set in train will continue based on cumulative emissions. According to the IPCC:

> A large fraction of anthropogenic climate change resulting from CO_2 emissions is irreversible on a multi-century to millennial time scale, except in the case of a large net removal of CO_2 from the atmosphere over a sustained period. Surface temperatures will remain approximately constant at elevated levels for many centuries after a complete cessation of net anthropogenic CO_2 emissions. Due to the long time scales of heat transfer from the ocean surface to depth, ocean warming will continue for centuries. Depending on the scenario, about 15 to 40% of emitted CO_2 will remain in the atmosphere longer than 1,000 years. (IPCC, 2014: 28)

* The Kyoto Protocol defined the GHGs as: Carbon dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydro-fluorocarbons (HFC), Perfluorocarbons (PFC), Nitrogen Trifluoride (NF_3) and Sulphur Hexafluoride (SF_6).

Some Earth system scientists have placed the threshold for 'safe operating space' at 350ppm and we are already well past that, but it is because observed effects at lower rises of temperature have been greater than initially thought and anticipated effects as temperatures rise are expected to be more extreme, that the Paris Agreement, negotiated in 2015 at COP21, aimed to restrict global heating to less than 2 ^{0}C with an aim of 1.5 ^{0}C. The IPCC is a UN mandated organization founded in 1988, and it collates climate science. It operates in cycles and forms working groups whose combined work is published at the end of the cycle as a synthesis report (we are in the sixth cycle and AR6 is due in 2022). It was mainly based on the IPCC *Global Warming of 1.5 ^{0}C* special report that governments acknowledged the need for greater urgency in achieving emission reductions and began to focus on the high profile goals of a 45% reduction on 2010 levels by 2030 and 'net-zero' by mid-century (IPCC, 2018: 12). The situation however continues to deteriorate in a number of ways.

Myriad actors have rhetorically taken on board the need to plan to decarbonise more rapidly with the aim of achieving 'net-zero' status. But much of this lacks effective concrete plans or clear implementable policy—in most cases governments are at the first step rather than having taken it—though hopefully COP26 in Glasgow November 2021 will signal some further progress. However, even the assessment of the nature of 'net' is in question insofar as many plans depend on smooth transition to use of technologies untested at scale and in some cases not yet existent in their anticipated form (see next section and Dyke et al., 2021; Lewis, 2021). There is much legitimate concern (especially in civil society) that 'net-zero' by mid-century is but another tactic of delay and deferral that in practice allows governments and corporate entities to continue with practices that perpetuate the present patterns of pollution and ecological degradation and destruction as if there were no real Emergency. If one looks to the 'Nationally Determined Contributions' (NDCs) of states, other aspects of government policy (creation of a new 'social infrastructure' addressing change to heating systems and housing standards, dependence on fossil fuel energy, transport systems, aviation, and shipping conformity, standards and goals for industry, digital service emissions etc.) in terms of real actions, as well as the actual activity (rather than statements of intent) by major global corporations and banks, aimed to produce radical and immediate greenhouse gas emissions cuts, then these remain woefully inadequate to prevent potentially catastrophic scenarios from becoming a future reality.

China is a major focus of concern. It may be the case that emissions have a strong correlation with inequality and that the majority of emissions have historically been accounted for by the longstanding industrialised countries and by a few corporations and so on. It may also be the case that 'just transitions' are a key issue, but unless emissions start to fall everywhere these problems become moot—and this means the major emitters today must begin to act now since the planet does not care about how we apportion 'historic emissions'. Richard Smith points out that China is more than simply the place wealthy nations outsource their emissions to through offshoring in globalized supply chains. It has its own internal drivers of climate profligacy and by various measures its share of emissions is disproportionate (based on the size of its population, its GDP, and GDP per capita). Moreover, its emissions continue to grow.

For more than a century the US was the world's largest CO_2 emitter by far. But its emissions declined from their peak of 7,370 million Mt CO_2e (metric tons of CO_2 equivalent) in 2007 to 6,457 million Mt CO_2e in 2017, reflecting the ongoing replacement of coal-fired power plants with solar, wind and lower-emissions natural gas energy sources. The emissions of the European Union countries have also trended downward over the past three decades, from 5,654 million Mt CO_2e in 1990 to 4,206 million Mt CO_2e in 2017. To be sure, these declines are far from sufficient to reverse global warming—they aren't even enough to meet their commitments to the 2015 Paris Agreement on climate change—but at least they were declines. By contrast, China's carbon emissions have relentlessly grown, quadrupling from 3,265 million Mt CO_2e in 1990 to 13,442 Mt CO_2e in 2018… [Though China is the world's biggest investor in and producer of renewable technologies across economic sectors it continues to build coal power production facilities and capacity] China isn't replacing fossil fuels with renewables so much as building more capacity of *both*. (Smith, 2020: xiv) In just twelve years from 2005 to 2017, China's CO_2 emissions nearly doubled again to more than twice those of the US. Yet China's GDP was only 63% as large as the US GDP in 2017… [While] Per capita CO_2 emissions surged past those of the EU six years ago and are now half those of the US (7.45 Mt CO_2e vs. 15.56 Mt CO_2e in 2018). Yet China's per capita GDP was just 15 percent that of the US in 2018 ($9,627 vs. $62,904) [and its population was just 68% of the five other top emitters]. (Smith, 2020: xiii & vii).

The point here is not to single China out in some malign sense, but to illustrate the urgency of the problem and to highlight a basic *shared* issue that countries and corporations have different reasons (and continue to different degrees) to try to square a circle that seems impossible to square. China is committed to maintaining economic growth of around 6.5% per year and is still building coal-powered power stations. And despite the IEA stating a need to stop the search for new fossil fuel sources, most countries in the world have continued to do so.

In the meantime, emissions continue to rise across the world albeit at a slower rate, and trends remain adverse despite the temporary dip in emissions that resulted from the COVID-19 global pandemic in 2020. The UNEP publishes periodic emissions gap reports and the latest (the eleventh) in 2020 reveals yet another set of dire statistics for current and projected greenhouse gas emissions—record levels in every category of measurement, for example, 38Gt CO_2 from fossil fuels in 2019 (UNEP, 2020). We are already witnessing more frequent and intense 'extreme weather events' all around the globe: widespread forest fires, more intense hurricanes, extended droughts, and sudden deluges resulting in flooding. Much of this is occurring earlier than expected and this too speaks to growing concerns expressed by climate and Earth systems scientists. There are inherent limitations in attempting to model complex systems based on multiple interacting and dependent aspects, and reasonably well-understood relations and processes can still deliver surprises and are subject to basic uncertainty. As longstanding IPCC contributor and one of the originators of the planetary boundary approach to Earth systems (and one of the early proponents of the Anthropocene concept), Will Steffen, puts it:

> We know, with a high degree of certainty, that many positive feedback processes exist, but we don't know—with a high degree of certainty—where the tipping

> points for these processes might lie. That is, where is the level of forcing (e.g., temperature rise) beyond which permafrost melt becomes self-reinforcing and thus unstoppable? Even more uncertainty surrounds the interactions among these feedback processes, interactions that could lead to a global tipping cascade. In effect, this is the process that would drive the Earth System from one stable state—the Holocene—into another stable, but much hotter, state, sometimes called 'Hothouse Earth'. Large uncertainties remain regarding the point at which such a global tipping cascade, if it exists, could be initiated (Steffen and Morgan, 2021).

A recent paper in *Earth System Dynamics* highlights this problem of uncertain 'domino effects' and problems of sudden runaway irreversible changes (Wunderling et al., 2021). The underlying point such science alludes to is that even the best science we have can be underestimating the problem and that problems might begin to manifest earlier than expected and there is some evidence that we are beginning to see that now. For example, temperature variation at both poles have been much wider (and temperatures far higher) than in recent history and the rate of melting of ice sheets has accelerated, while the rate at which ice shelves in the West Antarctic impede this has slowed due to fragmentation of sheets rather than a slower effect from just gradual melting (Joughin et al., 2021).

The situation then, hangs in the balance and a recent well-publicised report from IPCC Working Group 1 ('physical science') highlights this (IPCC, 2021). The report provides detailed measurements of the actual extent of greenhouse gas emissions and unfolding global climate patterns. According to the report, 'low likelihood' but potentially high impact or 'extreme events', including the possibility of 'abrupt responses and tipping points of the climate system' are now becoming more likely as global heating continues. This includes processes such as Antarctic ice sheet melt, forest dieback, and the (ongoing) slowing of the Atlantic Meridional Overturning Circulation (AMOC) oceanic flow (the conveyor which brings warm waters north in the Atlantic, popularly known as the Gulf Stream). Among the further consequences are continued trends of ocean acidification, and sea-level rise, which will be 'irreversible for centuries'. According to the report, humanity is currently on course for the IPCC 'intermediate' and 'high' emissions scenarios, which could produce heating of 2.7 ^{0}C to 3.6 ^{0}C by 2100. Moreover, the report makes it very clear **that in all 5 of its scenarios**, within the next two decades it is now likely that global warming reaches or exceeds the 1.5 ^{0}C goal of the Paris Agreement, regardless of how radically governments and corporations now cut greenhouse gas emissions, moreover it may do so earlier than previously expected (up to twenty years earlier when compared to the IPCC special report of 2018).*

The authors of the special report, however, make every effort not to convey the impression that our situation is irredeemable. According to the report the 'good news' is that, in the most ambitious low emissions scenario, the global climate might eventually (re)stabilise after

* The expectation is that 1.5 ^{0}C will be reached by 2040 at latest compared to 2052 previously but the band overlap allows for 20 years; and the report begins from a current averaged heating figure of 1.09 ^{0}C, which as some of the previous material indicates, is less than some datasets (placing it at 1.2 ^{0}C to 1.3 ^{0}C).

some 20 years, and global heating could fall back to 1.4 ^{0}C by 2100—commensurate to Paris goals. This is a highly optimistic account of scenario pathways that assumes immediate and effective actions to achieve 'net-zero' through more ambitious NDCs, major changes to land management, significant emission reductions across all aspects of society and economy, and with an additional role for carbon capture and also potential atmospheric carbon removal i.e., 'negative emissions'. To put this in context, depending on the measurement category, humanity emits around 40 billion tonnes of CO_2 per annum into the atmosphere. Under the 'very low' emissions scenario that will need to fall to 5 tonnes per annum by 2050. As Ed Hawkins, one of the authors of the IPCC report states, 'Every bit of warming matters… Every tonne of CO_2 matters.'*

The 'good news', furthermore, has additional context. With assistance from members of Scientist Rebellion a leaked report has emerged from sources within IPCC Working Group 3 (CTXT, 2021).† This is the group responsible for analysis of how to reduce emissions and mitigate impacts. Their final report is not due to be published until March 2022, long after vital decisions have been made at COP26 and this seems to have motivated a breaking of ranks. According to the leaked report, emissions must peak globally *before* 2025 and reach net-zero between 2050 and 2075. Concomitantly, no new coal or gas-fired plants should be built and existing ones should be wound down before their normal time of decommissioning, growth in global consumption of energy must *reduce* and there must also be a 'massive transition in the consumption of materials around the world' i.e. a *reduction* in a whole array of processes that produce emissions over and above the energy sector (CTXT, 2021). The report represents yet another ramping up of calls for urgent and immediate action and the significance of this leaked report is not only scientific but also political, given there is a clear sense that the leak was provoked by concern among some of the scientists involved that their findings and urgent warnings would be watered down through the intervention of governments in the complex processes of approval of IPCC reports before final publication. They did not want to risk that, and so they sought to ensure that their actual findings could be discussed globally prior to COP26.

So, as new data has emerged, scientific warnings have grown ever more urgent and there has been a recent trend for observed effects to tend to the severe end of possibilities i.e. worst-cases—and this is despite some consensus that climate sensitivity might be within a narrower band than 1.5 ^{0}C to 4.5 ^{0}C per doubling of CO_2, but partly accepting a continual problem of underestimating of effects in modelling systems and underlying problems of uncertainty regarding where exactly self-reinforcing transitions might lie.

4. Social Redesign, Redistribution, and Doing Less versus Technofixes and Technocratic Desperation?

We seem to have reached a political crossroads as much as a climate one. Until recently it was not uncommon for climate activists to ask, 'what will it take to make enough people, and

* Ed Hawkins, Reading University, UK, cited in New Scientist, 9 August, 2021 'Earth will hit 1.5^{0}C climate limit within 20 years, says IPCC Report'.
† See: https://scientistrebellion.com

enough people in places where power centres reside, sit up and take notice?' We now seem to have reached that point. In the last few months there has been virtually no corner of the world that has not reported an extreme weather event that has required a disaster response. And these seem to be coming thick and fast now. For example, in early September 2021 the *Washington Post* conducted an analysis and found that nearly a third of Americans lived in a county within an area where the federal government had declared a disaster in the previous three months and two-thirds lived in a county that had suffered a dangerous heatwave (Charter, 2021). A simple Google search quickly throws up similar events elsewhere, all in July—Angela Merkel's shocked face as she confronts destruction from flash flooding in Germany, terrible pictures of commuters trapped in a flooded underground rail service in Zhengzhou, Henan Province in China, a rare high-pressure heat dome effect in Canada producing temperatures of nearly 50 ^{0}C (in a country whose previous and *recent* record temperature was 45 ^{0}C) etc. *

Flooding and outright destruction of homes, interruption to taken-for-granted basic services such as electricity, sanitation, and transport, and various other observable impacts mean the consequences of disaster (not just minor inconvenience) are being *felt* in more places and thought about everywhere. It is surely beginning to dawn on people in a visceral way that climate and ecological breakdown are a threat to social cohesion and it is surely starting to occur to more people than in the past that if this is happening at current temperatures then it can only get worse as temperatures rise… As such, populations are now becoming more receptive to policy change to address these problems (with some likely friction created by demagogues like Trump or Bolsonaro) and this receptivity seems set to grow.†

The question, of course, is 'what to do?' and here governments face a basic decision regarding how to frame responses. At the moment there is a strong 'technofix' and technocratic dimension to policy framing. 'Technofix' does not mean the use of technology—clearly, any response to climate and ecological breakdown will involve technological change.‡ 'Technofix' means presenting technology as *the* solution to a problem and while in real policy circles it rarely rises to the status of the only solution there is a typical tendency to place primary focus on technology. As we previously noted a dominant focus on technology tends to gloss over a whole host of issues and the list of issues can be extensive: whether a technology currently exists, whether it is possible in principle, whether it can be scaled, whether resources (real and financial) can be organised to expedite it, whether it can be commercialised, and whether any and all of these apply within relevant timelines. And behind these sits also the temptation to proffer technological fixes because these offer the scope for apparent solutions that change the means by which we do things but have less impact on what we do and thus the drivers of the system in which we do those things. This readily becomes a line-of-least-resistance approach to policy—selling the public on the idea that fundamental changes to society are less necessary and perhaps unnecessary. However, given the whole array of risks and uncertainty associated with technology, the problem of timelines and urgency, and the fact that technofixes do not address the underlying sources (drivers of energy and resource use

* BBC report of Merkel's response: https://youtu.be/faXSsw76C9A Henan flooding reports: https://www.bbc.co.uk/news/world-asia-china-57861067

† See, for example, the recent University of Bath 10 country youth survey of climate fears: https://www.bbc.co.uk/news/world-58549373

‡ For an interesting survey of innovations see the BBC podcast series, '39 Ways to Save the Planet': https://www.bbc.co.uk/programmes/m000qwt3

built around economic growth and the vested interests of powerful groupings liable to create delay) of climate and ecological breakdown, then such an approach seems reckless at best.

There are, of course, different arguments—whether growth is an inherent aspect of capitalism, whether economic growth can be sufficiently 'decoupled' from climate effects to allow a growth system to be viable, whether it is best to focus piecemeal on reducing emissions and resource use and just not worry about economic growth as a metric—and these can be claims about theory (is something impossible in principle?) or can be more empirical (what does the evidence currently suggest?). We would argue (and this is basic to the essays in the special issue of *Globalizations*) that both theory and evidence are on the side of reducing the size of economies in aggregate. We would argue that this requires different ways of thinking about the nature of economic systems, what drives them and how they 'provision'. Moreover, in the absence of full certainty this would also seem to be the rational prudential response to the urgency of our situation. Technofixes place confidence in things that may not be possible in various senses of that word. However, as a species we can control the conventions by which we live since these are a matter of how we organise and what we choose collectively to do. In this sense social redesign is more realistic and achievable than technofixes (though opinions differ, contrast the critiques of growth by Keyber and Lenzen, 2021; Hickel and Kallis, 2020; Parrique et al., 2019; and the recent techno-optimist behavioural analysis from Tony Blair's think tank, Meyer and Lord, 2021).

Consider, for example, the range of changes the 2021 Working Group 1 IPCC report we previously referred to suggests. Quite a bit of this (in addition to land use changes) turns on technologies—some of them more advanced in development than others, but all invite basic questions regarding feasibility and advisability. At the extreme are negative emissions technologies. Iceland is perhaps most advanced in establishing proof of principle for these technologies. Climeworks' 'Orca' plant has just been completed there and it comprises a huge fan system running on Iceland's abundant geothermal (renewable) energy that sucks surrounding air through filters that extract CO_2. Once the filters are saturated, they are heated to release the CO_2 into water which is then pumped into underground caverns where the carbon reacts with basalt and up to 90% of the CO_2 is mineralised within 2 years. The plant has a capacity of around 4,000 tonnes of CO_2 a year, a meaningless amount in terms of current emissions levels but sufficient for the IPCC report to mention the technology and there are several variations on this theme now in development around the world.* One might describe this as an ingenious technological marvel, but equally it might be viewed as the desperate last gasp of a moribund system. The order-of-magnitude difference between capacity and the reality of emissions makes these technologies marginal at best and their existence cannot 'dematerialise' an economy.

The problem with technofixes (rather than technology per se) is that its framing of technology becomes a distraction and source of complacency—even if well-meaning and

* Note, while these atmospheric negative emissions technologies are relatively new, bioenergy with carbon capture and storage (BECCS) have been an assumed component of net changes to emissions since at least IPCC AR5 (whose primary concerns predate the 1.5^{0}C goal of Paris and which assumes a growing role for this and forestation over the second half of the century based mainly on a 2^{0}C target). Work questioning the feasibility of this modelling (itself using fairly dubious integrated assessment models) is longstanding. (See, for example, van Vuuren et al., 2018).

even if there are plenty of people urging us to keep new technology in perspective. There is a tendency to think solutions are in hand and one might argue that it takes a great deal of socialisation to persuade us that technology is a more realistic escape route than social redesign—it requires us to have an oddly disempowered sense of what we could control and what we are able to decide to do. This brings us to the technocratic dimension of current policy. Few readers will need persuading that we live in societies with a complex division of labour that has exhibited a general tendency for capture of authority and control of decision-making. The curious thing about this in the modern era is that 'neoliberalism' has combined this with marketisation. We tend to accept that market processes can solve problems as unintended consequences of processes of profit-making etc. and we tend to accept that society is complex and that it is experts in given fields who should make primary decisions about what is done and how—economics of course has been a primary site for these changes.

Technofixes become more attractive if one has a technocratic mindset, and yet even technocratic responses require buy-in by citizens. Citizens, for example, are required to adopt market psychologies and make 'investments' to ensure technological changes happen—electric cars, hydrogen heating systems, new insulation for homes etc.—in order for technology to be mirrored by behaviour. But this has self-limiting potential since it invites citizens to treat collective existential threats as individual consumer decisions. More fundamentally it socialises people to think less about the norms by which they live and to expect to have less scope to deliberate and participate in decisions about society. The problems this has caused, of course, do not relate only to climate and ecological crisis—they are relevant to a host of issues regarding the crisis of democracy (polarisation, cynicism, sense of disenfranchisement etc.) that has erupted, but for our purposes, the combination of disempowerments is extremely problematic since from a climate and ecological point of view, it is the system itself that is in question.

One might argue then that the system itself makes thinking about living differently problematic even if the problems of that system seem to require us to do so. 'Problematic', however, does not mean impossible (and see conclusion). Recognition that more fundamental change is needed is growing and has numerous sources. Physicists, climatologists, Earth system scientists etc. are rarely by inclination radicals and have over the years (with a few notable exceptions) tended to be reticent about organising and campaigning (perhaps concerned that this would harm scientific credibility). But the situation is now dire enough for the scientific community in the guise of groups like The Alliance of World Scientists to take a leading role in declaring climate emergency and in making the case for radical and urgent action (see Ripple et al., 2021a, 2021b). Social movements creating pressure from below are also on the rise and demonstrations, dissent and disobedience are occurring around the world. Many events are currently (at time of writing) planned to create pressure in the run-up to COP26—for example, the 'Fridays for Future' global climate strike held on 24th September 2021, and the latest 'Global Day of Action' held on November 6th.* General activist groups such as Extinction Rebellion can now be found in many parts of the globe, as

* Visit: https://fridaysforfuture.org; https://en.wikipedia.org/wiki/Global_Day_of_Action; https://takeclimateaction.uk/get-involved/global-day-action-6-november-2021

can sector-specific groups such as the aviation campaigning organisation, 'stay grounded'.* These movements can be expected to grow in the coming decade, and depending on the decisions made and actions implemented by governments, corporations, and banks, may potentially become even more radical in their tactics and their demands. In any case, such calls for 'system change' imply the existing social order is open to question (Gills, 2020).

It should also be noted that officials, governments and groups like the IPCC have begun to make statements or offer analysis that endorses reducing the scale and intensity of economies, and recognise the importance of 'just transitions'—albeit inconsistently. The leaked Working Group 3 report from the IPCC, for example, states, 'In scenarios that contemplate a reduction in energy demand, mitigation challenges are significantly reduced, with less dependence on CO_2 removal (CDR), less pressure on land and lower prices of carbon. These scenarios do not suppose a decrease in well-being, but rather a provision of better services' (CTXT, 2021). The report also suggests it is possible to address extreme poverty around the world without exacerbating the global heating crisis—given that 'the largest emitters are the richest' and the richest 10% emit ten times more than the poorest 10%' (CTXT, 2021). As such, the report resonates with some aspects of degrowth, postgrowth and social ecological economics and we would argue that there is great scope for development along these lines to combat misunderstandings regarding what these entail (see Spash and Guisan, 2021; Hickel, 2020b; O'Neill, 2018; Liegey and Nelson, 2020; Kallis, 2018; Demaria et al., 2013).

There is a great deal more that could be said here, but space precludes further discussion. Suffice to say, and in regard of the 'crossroads' we find ourselves at, we would argue that we should turn towards doing less… we need a concept of 'enough', of 'sufficiency' and 'sufficient development', and these concepts need careful elaboration. In the current environment, people confuse degrowth, post-growth and socio-ecological economics with their experience of uncontrolled collapse, recession etc.—situations of rising unemployment, falling incomes, individual suffering, and systemic pressure. Degrowth, however, is not this—it is in fact an attempt to prevent a future climate-induced version of this problem via a managed transition that redirects resources in smaller economies to meet needs through different sets of 'satisfiers' (allowing for smaller working populations, universal basic income, and universal basic welfare services, more focus of resources on meeting primary care needs, and a decisive shift away from economies built around designed obsolescence, conspicuous and superfluous consumption and waste creation).

Moreover, this approach to 'enough' is *not* about preserving the privilege of some wealthy parts of the world by denying development to others. It rather extends concepts of justice and redistribution to planetary scales precisely in order to avoid the all too foreseeable consequences of global climate emergency and ecological breakdown: an intensification of trends we are already beginning to see, such as fractious conflict as global North states compete for diminishing resources and to control borders as mass migration increases to escape the immediate effects of insecurity (see, for example, Quiggin et al., 2021: 36). As readers are no doubt aware, it has always been the poorest in both the global North and

* Visit: https://stay-grounded.org

South who have suffered first and most from crises and climate crisis is no different in this regard. For example, in launching its Children's Climate Risk Index UNICEF reports that about 1 billion children live in 'extremely high-risk countries' (nearly 50% of children)—areas exposed to multiple vulnerabilities of drought, heatwaves, flooding etc.* Of these the highest ranked countries are mainly in sub-Saharan Africa, though Bangladesh and India are also listed (UNICEF, 2021: 14). India is the only one in the top ten carbon emitters and the 'extremely high risk countries' in combination account for only 9% of annual global emissions.

> *"While the pandemic will eventually end, responses to it have created a precedent. Dramatic action is now urgently needed by all—from governments, financial entities, corporations, communities, households, and individuals. We need to believe 'deep restoration' is possible and we need to act like it is possible."*

The degrowth alternative begins from the premise that current development models perpetuate structural inequality and we should stop taking from the poor (see Hickel et al., 2021). As with so much else this may seem like utopia but refusal to countenance something is not the same as its impossibility. Universal suffrage seemed absurd in societies built around strict hierarchical distinctions rendered as God-given 'natural order', and yet eventually change came—people struggled and *took* rights previously denied to them. The first step in doing so was thinking differently and understanding that 'different' is also feasible (for climate-based feasibility argument see, for example, O'Neill et al., 2018). In contrast, hanging onto attitudes and practices associated with a necrotic climate profligate civilization may turn out to be the real fantasy.

5. Conclusion: from Crisis to 'Transversalism'

As we stated in the introduction and as our essay title (the phrasing 'demand') suggests this paper amounts to reasons why a new paradigm is needed rather than a detailed account of its content. Again, we suggest you read the special issue papers and other noted sources. To conclude, we would note that we are in the midst of a triple crisis of capital, climate, and COVID, and their intimate interrelationship, is now apparent to everyone. The existing global system, and indeed our present form of civilisation, is entering a period of 'implosion' (Gills, 2020).

One thing seems certain, that what 'we' i.e., the whole of humanity, do to respond to the present accelerating climate emergency and ecological breakdown during the decade of the 2020s is absolutely pivotal to our future. Our collective actions will largely determine the future prospects of humanity for centuries to come. The 'radical urgency of now', is here.

* Visit: https://data.unicef.org/resources/childrens-climate-risk-index-report/

An 'age of adaptation' looms, and an era of 'the politics of tipping points' will ensue (Lewis, 2021). We urgently need transformational change, across myriad processes and behaviours, at all levels from the individual, to the national, regional, and global. We need to redefine and transform our way of life. Politics and policy in the coming decades will be compelled to debate and organise sweeping adaptations and mitigation, as the progress of the global climate crisis increasingly threatens our existing infrastructure, built environment, and food system with increasingly rapid obsolescence. How will we provide cabling for power infrastructure and surfaces for roads in periodic *melting* temperatures, how will we maintain crop yields in the face of *pervasive* unpredictable flooding combined with heatwaves and drought (Quiggin et al., 2021)? As global heating increases, our existing infrastructure, built environment, and agricultural and forestry systems will be rendered 'unfit for purpose' and will become more prone to potentially calamitous system failures. We need to redesign our civilisation.

While we need governments to act, and policy coordination through initiatives such as the COP process are vital, they are not sufficient and we cannot depend on them. Political pressure and grassroots changes from below are just, if not more, important. For this to be achieved we need new ways of thinking. 'Transversalism' is one possibility. Rather than co-optation:

> Transversalism aims at consolidating political coalitions and achieving ideational accommodation between social groups… it does not imply uniformity or a general theory of social emancipation… [it] consists of the following elements: (1) recognition of diversity and difference, (2) dialogue (deliberation across differences), (3) systemic self-reflection, (4) intentional openness (intention to explore the reality of the Other), (5) critical awareness of the intersectional nature of power relations that affects interconnections, and finally (6) commitment to creating alterity through hybridization and creolization of ideas and actions. (Gills and Hossieni, 2021)

'We are living in a time of exception. A time when the existing order is open to question' (Gills, 2020: 577). The triple conjuncture of climate change and ecological breakdown, global pandemic, and neoliberal economic globalization speak to a Great Implosion, and while the pandemic will eventually end, responses to it have created a precedent. Dramatic action is now urgently needed by all—from governments, financial entities, corporations, communities, households, and individuals. We need to believe 'deep restoration' is possible and we need to act like it is possible. Maybe this is wishful thinking, but without it our nightmares may become realities.

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