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Let Nature Play: A Possible Pathway of Total Liberation and Earth Restoration

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Abstract

A Total Liberation Pathway is proposed, involving an abolition of compulsory work for all beings. This trajectory involves drastically shortening humans' workweek, ending the exploitation of animals including for food, and rewilding ecosystems currently exploited as "working landscapes." Using the climate models the Global Calculator and C-Roads Pro, I demonstrate that the Total Liberation Pathway could return atmospheric CO2 and global temperature levels to the 300 ppm and 1°C targets demanded by the 2010 People's Agreement of Cochabamba, and could achieve the precautionary target of rewilding of 75% of the Earth. I also propose possible contours of a strategy of resistance and reconstruction. Although Indigenous communities and energy and agricultural workers will have an indispensable role in the transition, through control over land

and key economic bottlenecks, the entire resistance of human and nonhuman beings offers hope. Letting nature play, humans included, could enable a livable future.

Many argue that we are running out of time, but perhaps the problem is time itself. Or rather, it is the alienated time that we spend working on the clock, obsessively looking at screens, letting consumption of commodities dominate our free time and even invade our dreams. And it is the perception we often have of the universe as a giant clock, an inert machine to be put to work. Too often, there is no sense that nature, ourselves included, has a right to relax, a right to be lazy, a right to play.

While Autonomist Marxists define capitalism as an "endless imposition of work" on human beings (van Meter, 2017), we could add that the system also imposes endless work on nonhuman animals and nature. Moving even beyond the van Meter's broad conception of the working class as inclusive of "students, housewives, slaves, peasants, the unemployed, welfare recipients and workers in the technical and service industries" in addition to the industrial proletariat, Jason Hribal (2012) describes exploited animals as working-class. He points to animals' labor for humans' food, clothing, transportation, entertainment, and medicine. Corroborating such a perspective, capitalists themselves label exploited ecosystems as "working landscapes" (Wuerthner, 2014), exploited farm animals as "labouring cattle" (Hribal, 2012), genetically modified crops as "living factories" (Fish, 2013), and extracted hydrocarbons as "energy slaves" (Fuller, 1940). As summarized by Indigenous Environmental Network director Tom Goldtooth (2015) the dominant worldview posits that "Mother Earth is a slave." This endless work has been disastrous for the planet. Humans' long hours of alienated labor contribute to deeply destructive economic growth (Hickel & Kallis, 2019; Knight et al., 2013). So does the exploited labor of animals, with livestock taking up some 76% of the world's agricultural land (Poore & Nemecek, 2018). Working landscapes "suffer losses in biological diversity, soil health, and other ecological attributes" (Wuerthner, 2014). And even the cleanest "energy slaves," wind and solar power, can require large amounts of resources and land in the context of a growing economy (War on Want & London Mining Network, 2019).

The resulting situation is, for humanity, a double apocalypse involving death on the inside and outside alike, a waking nightmare of alienation and annihilation. Vast majorities of wage-laborers report "sleepwalking through their workday" or worse (Gallup, 2013). Students are overwhelmingly bored and stressed during the school day (Watson, 2015). Silvia Federici (2012) reports that housewives see their endless cleaning and domestic obligations as "hard, hated work that wastes our lives." Ongoing ecological and climate crises already kill millions of human beings each year , and scientists warn that society may soon trigger tipping points leading to "civilization-ending apocalypse" (Bulletin of Atomic Scientists, 2022) and potentially even the "annihilation of all life" (Strona & Bradshaw, 2018).

Given these challenges, it's understandable that many Leftists and ecological activists succumb to compromise, surrender, or high-tech fantasy. Like many Green New Deal champions, Naomi Klein (2019) has advocated a "1.5–2°C" target that, as explained below, could trigger tipping points bringing global warming to annihilatory levels. Even more troubling, the popular eco-radical

pamphlet *Desert* urges readers to "give up hope" and to resign ourselves to the inevitabilities that "Global climate change is now unstoppable" and "we seem set for yet another, if anything more brutal, century of wars and insurrections" (Anonymous, 2011). Many Marxists have embraced a destructive high-tech "ecomodernism," critiqued by John Bellamy Foster (2017), while others including Foster, greenwash highly polluting and destructive states such as China's (Pirani, 2021).

Accordingly, I propose a possible pathway that follows the precautionary principle (Burkett, 2018) which requires that all safe and non-authoritarian measures be taken to reduce risks of catastrophe. Since scientists say time is running out, and they're not wrong, I will not waste time with half measures, nor with top-down "false solutions" (Amorelli et al., 2021) such as geoengineering, nuclear energy, bioenergy, and hydroelectricity, which pose ecological and social threats comparable to climate change itself. I adopt the precautionary targets demanded by the 35,000 participants of the 2010 Cochabamba World People's Conference: bring atmospheric carbon dioxide below 300 parts per million (ppm) and global warming below 1° Celsius relative to pre-industrial levels. In short, this is a proposal for an abolition of compulsory work for all beings. It involves rewilding at least 75% of the Earth with guidance from local and Indigenous communities, and ensuring that the remainder of the planet "abolish[es] the wage system, and live[s] in harmony with the Earth" as proposed by the Industrial Workers of the World (IWW) (2021).

The synergy of reduced work and ecological restoration offers a path beyond the current impasse of mainstream and much radical eco-politics. David Graeber (2018) observes, "in ecological terms, a mass reduction of working hours is probably the quickest and easiest thing that could be done to save the planet." The 2020 economic slowdown caused by the COVID-19 pandemic, while too short-lived to significantly reduce climate change, gave workers a temporary experience of a society with far less work. People in many countries resisted a return to full-time work. The spread of explicitly anti-work ideas (Manjoo, 2021) showed the potential appeal of solutions involving reduced production. Meanwhile, the pandemic's likely origins in a meat and seafood market (Zimmer & Mueller, 2022), and growing attention to animal agriculture's central role in causing prior pandemics (Levitt, 2020), demonstrated an urgency for adopting plant-based diets.

In the following three sections, I describe a Total Liberation Pathway (TLP). First, I describe what it would mean to liberate all beings from compulsive labor. Second, I use climate models to demonstrate that this trajectory has a reasonable chance of achieving the precautionary climate targets of 300 ppm and 1°C without resorting to false solutions such as geoengineering. Third, I outline possible contours of a revolutionary scenario that can implement the Total Liberation Pathway, although it is only a source code that will need to be adjusted from below based on local and changing conditions.

Eliminating Compulsory Work for All Beings

If the world's abundant wealth were much more equally shared, and if people therefore did not have a pressure to work so much in order to survive, many possibilities would blossom. In such a context, shrinking global production would vastly reduce ecological and climate pressures while

also enabling a shorter workweek for humans. In a degrowing and non-consumerist Global North, it would be possible to bring humans' workweek below 10 hours with only a modest reliance on ecotechnologies. In 1947, Paul and Percival Goodman estimated that a tenth of the United States' labor, four weekly hours, was sufficient to locally produce basic needs. The key steps to abolishing compulsory work for humans are eliminating wasteful work, redistributing wealth and reducing alienating consumption, introducing labor-saving ecotechnologies, and transforming the remaining production into playful and self-managed activity.

The first step involves eliminating wasteful, unproductive labor. Currently, First World employees themselves consider more than 50% of their workweek to be unproductive or "bullshit" according to various surveys, polls, and interviews collected by Graeber (2018), who summarizes that "we could probably get the *real* workweek down to fifteen hours—or even twelve—without anyone noticing much." Ken Smith estimated in 1988 that wasteful labor comprised some 90% of wage labor in the United Kingdom. Additionally, the Global South has its own high amount of wasteful or "bullshit" labor. "A vendor selling slide whistles blasts a mocking trill—several times a minute, seven hours a day," Robert Neuwirth (2011) describes a São Paulo intersection where workers begin gathering at 3:30 in the morning to sell balloons and plastic toys. Half of the world's employed population, and 60% in Africa and Asia, work in this non-agricultural "informal" sector (International Labor Organization 2018), sometimes spending their days selling pirated DVDs or sitting in Internet cafes sending out email scams. Much of this work, in the North and South, could be eliminated without even challenging consumerist lifestyles, although it could help the planet, for example by reducing car commutes and offices printing.

Of the remainder of the North's workweek, a majority could be eliminated by redistributing wealth and eliminating consumerist habits that aren't even making people happy. It's estimated that the world's richest 1 percent bags 82% of the world's wealth (Oxfam, 2018) and emits 175 times more carbon than the poorest tenth (Oxfam, 2015). Clearly they will need to give up the most. Yet, even many workers who belong to the North's so-called "middle class" would live more fulfilling and joyful lives by replacing consumption with fulfilling experiences. Fromm (2008) pointed out that the "great Masters of Living"—such as Buddha, Jesus, Master Eckhart, and Marx—emphasized that good living focuses on being rather than having. Fromm argued that the "having mode," which Buddha called craving and Judaism and Christianity call coveting, leads ultimately to "unhappiness and suffering." Empirical research has corroborated his assessment that consuming doesn't lead to lasting happiness (Kasser et al, 2013). Ed Diener and Martin Seligman (2004) find that raising a country's per-capita GDP above $10,000, slightly below the world's per-capita GDP and less than a fifth of the United States', provides "virtually no increases or only small increases in well-being." They further find, that "health, quality of government, and human rights all correlate with national wealth, and when these variables are controlled, the effect of income on national well-being becomes nonsignificant." Rather than asceticism or austerity, the solution could be an approach that Kate Soper (2020) calls "alternative hedonism," involving "time freed up for the arts of living and personal relating currently being sacrificed in the 'work and spend' economy." Along these lines, social movements around the world are embracing notions of *buen vivir* (living well) that suggest forgoing consumerist aspirations can greatly increase general health and happiness as well as sustainability . There are many names for analogous concepts around the

world, including *ubuntu* and *ujamaa* in Africa, *sumak kawsay, suma qamana*, *nandereko*, and *minga* in South America, and *Lagom* and *Allemansrättin* in Europe, *mino bimaadiziwin* and *hózhó* in North America, and *sarvodaya* and *swaraj* in Asia.

A modest use of labor-saving ecotechnologies can further reduce working hours, especially in the Global South. The open-source machines comprising the Global Village Construction Set are designed for "at 2 hours of work per day – using local resources – regeneratively – achieving a modern standard of living" (Open Source Ecology, n.d.). Decentralizing global production would lift a burden on the South, making a 10 hour workweek possible there as well. As a form of reparations for centuries of plunder, the North should freely share ecotechnological blueprints such as those for the Global Village Construction Set's machines. With a radical reduction of the formal workweek, it would be possible to evenly distribute household and caring labor across all genders, compared to the gendered "second shift" that housework represents for women today (Hochschild & Machung, 2003). In the North, having less stuff will also mean there's less work involved in cleaning and maintenance.

The remaining 10 or so hours of work could be transformed into self-managed and voluntary craft and hobbies. For those with access to some free time and meaningful community, there is immense interest in collectively learning skills like how to garden, cook, and sew clothes. Community gardens and Maker Spaces are sprouting in many places. Performing productive activity as a community can make the work more enjoyable.

For nonhuman beings, too, eliminating compulsory work will not require an elimination of all productive activity. There is no necessary exploitation in teaching a dog to guide a blind, human best friend around, for example. MacPherson-Mayor and Daalen-Smith (2020) propose a non-hierarchical partnership between a willing guide dog and human, based on personal experience of a guide dog volunteering its services and enjoying and benefiting from the role. However, they discuss how many guide dogs are instrumentalized and mistreated, as are other dogs who work in police and laboratory roles. Indigenous cultures and radical ecological movements have long intuited that the Earth willingly shares its resources to provide humanity's "basic necessities" (People's Agreement of Cochabamba, 2020) or "vital needs" (Harding, 2009). Gitxsan and Wet'suwet'en organizer Mel Basil describes the Earth's instruction to humans as "Take what you need and leave the rest" (Hill & Antliff, 2021). Even plants can be understood as willingly working under only certain conditions. Botanist Stefano Mancuso argues, "because plants are sensitive and intelligent beings, we are obliged to treat them with some degree of respect. That means protecting their habitats from destruction and avoiding practices such as genetic manipulation, growing plants in monocultures, and training them in bonsai." (Pollan, 2013).

By contracting and converging the world's energy usage at 40% of today's level, humanity can transition to all renewable energy, mainly small-scale solar and wind power, while also ensuring comfortable material living standards can be guaranteed to all of humanity. Joel Millward-Hopkins and co-authors (2020) and Kris De Decker (2018) argue that with expected energy efficiency improvements, just 40% of global energy usage would enable everyone worldwide to live at least as comfortably as today's frugal First Worlder. Even without expected efficiency improvements,

40% of today's energy usage could provide high living standards worldwide. The average Costa Rican, who uses about 40% of the global per-capita energy consumption, enjoys a higher well-being and life expectancy compared to the average United States resident who uses 350% of the world's average. Residents at Missouri's Dancing Rabbit Ecovillage, who each use 25% of the world's per-capita energy, report having more meaningful and satisfying lives than the average U.S. resident (Fischer, 2020). These lower energy consumption levels would make the transition faster and would address many concerns related to sustainability. Referring to Millward-Hopkins's proposed reduced energy consumption level, the degrowth scholar Jason Hickel (2020) reports, "This would make it much easier for us to achieve a rapid transition to 100% renewable energy, meeting our climate goals in a matter of years, not decades." War on Want and London Mining Network (2019) report that a degrowing economy would greatly reduce necessary materials and make possible a "post-extractive" energy sector. The Union of Concerned Scientists' analyst James Gignac (2020) emphasizes that recycling most components of solar panels and wind turbines is already possible, if costly, and that supportive policies could achieve "100 percent recyclability."

Given that the world's farmers already produce enough food to feed 12 to 14 billion human beings (IAASTD, 2016), feeding the actual population of 8 billion people will be largely a matter of eliminating animal agriculture and redirecting harvests from livestock to humans. Additionally, a decentralization of farming and an adoption of agroecological techniques would boost efficiency in labor and land. Community self-reliance would make obsolete most of the packaging, transport, and advertising that make up an estimated four-fifths (Trainer, 2018) or six-sevenths (Levins & Lewontin, 2018) of total agricultural labor. Agroecological techniques can save further labor in weeding and plowing and eliminate the labor involved in applying herbicides and pesticides (Altieri, 1999). Forgoing plowing and weeding, Masanobu Fukuoka (2009) described his low-tech, sustainable method as "a pleasant, natural way of farming which results in making the work easier instead of harder. 'How about *not* doing this? How about *not* doing that?'—that was my way of thinking."

Switching to entirely plant-based farming, by vastly increasing the efficiency of food production, would not only decrease labor requirements but would also increase local food self-reliance. Helen Harwatt and Matthew Hayek (2019) find that if the United Kingdom switched about one-third of the land used to grow livestock feed over to growing plant-based food for humans, then the country would be food self-sufficient not only in terms of calories and protein but also in terms of micronutrient needs. The other two-thirds of feed cropland and all of pasture could then theoretically be restored and used to sequester carbon dioxide. The authors also report that if the United States switched entirely to plant-based farming then it would feed an additional 350 million people, more than the country's current population. As detailed by contributors to *Rethinking Food and Agriculture*, (Kassam & Kassam, 2021), green manures and compost make a veganic agriculture possible without requiring animal-based or synthetic fertilizers. Drawing on examples from traditional Mesoamerican milpa farming and the present-day veganic movement, they describe vegan agroecology's benefits to soil health and agrobiodiversity.

Ending animal agriculture would be the most crucial step toward rewilding 75% of the world's planet. This step alone would liberate 76% of farmland (Poore, & Nemecek, 2018), comprising

37% of the world's ice-free land for potential rewilding. The large-scale farms covering 88% of global farmland should be the clear priority (Lowder et al., 2021), although global assistance should also be offered to those small-scale farmers who decide to transition to plant-based livelihoods and food sources.

Adding the 28% of ice-free land that only exhibits minimal human impact (Intergovernmental Panel on Climate Change, 2019) would bring the total of wild areas up to 68%. Halving food waste would free up another 5% (Röös et al., 2017), and eliminating biofuel use would liberate 2% (Cristina Rulli et al., 2016). Improving forestry practices and reducing wood harvests could free up another 3% (Dooley et al., 2018a), bringing the total of wild lands up to 75%. Land-efficient agroecological techniques (De Schutter, 2011) could bring the total even higher.

Notions of "tended" and "inhabited" wilderness (Anderson, 2005; Catton, 1997) permit an understanding that wild areas are defined not by an absence of humans but by a presence of self-willed nature. Indigenous and local communities must be respected as residents and guardians of wilderness areas. Dispossession must be adamantly opposed, and Indigenous peoples should have a right of return to their ancestral lands where they'll usually be far better caretakers than any state or corporate-funded nonprofit can be.

Currently commodified animals in farms, circuses, zoos, and breeding and research facilities can be adopted by sanctuaries and households where they can live out their lives without being further bred. Eliminating experiments on animals and experimenting instead with donated, lab-grown, 3D-printed, and computer modeled human tissues and cells would improve the accuracy and efficiency of medical research (Akhtar, 2015; Physicians Committee for Responsible Medicine, n.d.).

So far, I have tried to show that, while enabling comfortable living standards for all of humanity, it is possible to abolish compulsory work for all beings and to rewild the vast majority of our lives and our planet. In summary, the TLP would bring humans' workweek down to about 10 self-managed hours, abolish industries that exploit animals, restore "working landscapes" to wild conditions, and reduce overall usage of minerals and materials. The result, as I will argue in the next section, would be to bring into reach precautionary targets for climate and ecological protection.

Selecting and Achieving Precautionary Targets

In this section, I first argue for the necessity of aiming for Cochabamba targets of 300 ppm, 1°C, and a 75% wild Earth, and then I employ two climate models to demonstrate their achievability in the context of a revolutionary social transformation. Providing a significant buffer zone, I aim in these models for even more ambitious targets: bringing atmospheric CO2 to the pre-industrial level of 288 ppm, corresponding with stabilizing global temperatures below today's, and freeing up more than 80% of the Earth for grassroots protection.

The Cochabamba targets have vast support in scientific literature literature; 1 ºC of warming is not just dangerous but could potentially trigger cataclysmic climate tipping points. Timothy Lenton and co-authors (2019) warn that "tipping points could be exceeded even between 1 and 2 ºC of warming," and several of these same authors note that the tipping points can lead to a "Hothouse Earth" scenario eventually reaching the 5 ºC level (Steffen et al., 2018). The Hothouse Earth temperatures would cause "global diversity collapse" and are within the range of temperatures that can "annihilate planetary life" in the virtual Earth models of Strona and Bradshaw (2018). Leading climatologist James Hansen (2017) has stated, "Effective action must be undertaken not only to keep temperature rise below 1.5°C but, in my view, to return it to below 1° C to preserve island nations and global shorelines." The 300 ppm target also finds ample support in the literature. Over the past 400,000 years, the Earth self-regulated its atmospheric CO2 levels between 180 ppm and 300 ppm, and only surpassed the 300 ppm level after the Industrial Revolution. A stabilization of atmospheric carbon at 300 ppm or lower has been advocated by many scientists including Stephen Harding (2009), Hans Joachim Schellnhuber Barry Brook, Thomas Goreau, Barrie Pittock, Andrew Glikson, and Gideon Polya (Polya, n.d.).

Of the Cochabamba targets, 300 ppm is the more demanding. Hansen writes that 1°C could be achieved with atmospheric CO2 as high as 350 ppm (2017), and David Spratt and Philip Sutton (2008) posit that "320 parts per million" could achieve a "cap of 0.5°C." Stephan Harding (2009) estimates "300-350 ppm" would make sure that global temperature does "not exceed 0.5°C relative to pre-industrial levels." So, achieving 300 ppm most likely means achieving lower than 1°C.

Finally, although the goal of "Half Earth" has been prominently advocated by scientists including E. O. Wilson (Dooley et al., 2018a), a more precautionary goal would be preserving and restoring 75% of the planet. Representing each plant species in a protected area would require protecting "74.3% of the global land area" (Rodrigues & Gaston, 2001). Protecting ocean biodiversity and minimizing ocean population collapse may require conserving up to 76% (O'Leary et al, 2016). Shifting from biodiversity conservation to the more demanding ethic of "bioproportionality" (Mathews, 2016) gives further reason for protecting as much of the Earth as possible from intensive economic activity.

My use of C-Roads Pro climate model (Climate Interactive, n.d.), when combined with recent studies of reforestation and rewilding, demonstrates the viability of 300 ppm stabilization even if the Total Liberation Pathway is substantially delayed. I input that the world does not get started until 2025 and misses certain social movements' deadlines by a full decade. Whereas The Climate Mobilization (Silk, 2019) calls for decarbonizing the Global North by 2025 and the Global South by 2030, I enter that these goals are not achieved until 2035 and 2040. And whereas the New York Declaration on Forests calls for a global end to deforestation by 2030 (Dooley et al., 2018a), I enter that this goal is not achieved until 2040. My point is not to abandon the more stringent deadlines for decarbonizing, but rather I am saying that we should not give up on achieving 300 ppm even in the event that we miss them. Conservatively, I set the "climate sensitivity," the rate at which the planet warms, at 4.5º C, the upper-most estimate given by the Intergovernmental Panel on Climate

Change (Hansen et al., 2017). In Figure 1, the green line represents the TLP without the impacts of sequestering carbon dioxide through massive rewilding and reforestation. The result is that the atmospheric CO2 concentration peaks below 450 ppm and declines to 393 ppm CO2 by 2100. These results imply that we need to draw down more than 1 trillion tons of CO2 from the atmosphere to get to the 300 ppm target. This factors in the issue that, as Hansen and co-authors (2017) summarize, "ocean outgassing increases and vegetation productivity and ocean CO2 uptake decrease with decreasing atmospheric CO2." Due to these effects, Hansen estimates that drawing down an initial 197 ppm requires sequestering 328 ppm in total. Using this ratio, I calculate that drawing down 93 ppm would require a total sequestration of 155 ppm, which is roughly 1.2 trillion tons of CO2. This would involve reversing much of the estimated 1.8 trillion tons (Erb et al., 2017) of carbon dioxide emissions from historic land-use change, including pre-industrial.

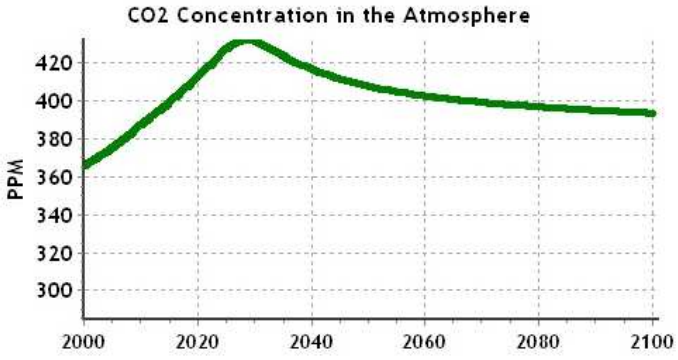

Figure 1

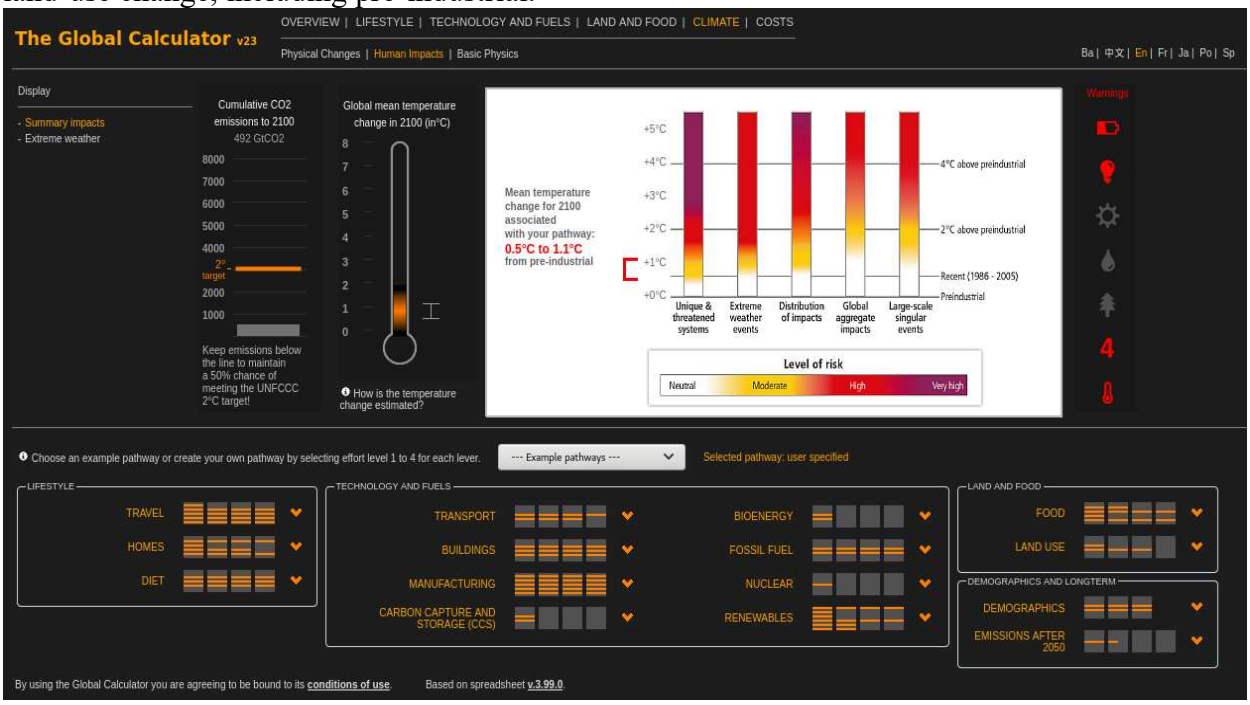

Figure 2

The scientific literature suggests the required carbon-dioxide drawdown could be achieved through rewilding and restoration, especially in a mostly vegan world. According to Mathew Hayek and co-authors (2020), restoring the land freed by a global vegan diet to wild forest and grasslands would remove some 0.8 trillion tons of CO2 from the atmosphere. We can further add the 0.6

trillion tons that Kate Dooley and co-authors (2018a, 2018b) estimate could be sequestered by additional reforestation and agroforestry, since they mainly rely on reduced wood harvest and explicitly "do not assume that reduced land demand from agriculture could be used towards climate mitigation." Already, this totals at 1.4 trillion tons of CO2 of restoration potential from terrestrial restoration methods alone, enough to bring atmospheric CO2 down from 393 to 287 ppm. There are indications that rewilding marine ecosystems offer significant sequestration potential. Marine Conservation Society and Rewilding Britain (2021) report that restoring an area of saltmarsh, seagrass, or mangrove sequesters more CO2 than restoring the same amount of tropical forest. Restoring marine mammal populations would also bring significant CO2 sequestration, with each whale absorbing as much CO2 as "thousands of trees" and bringing it safely to the ocean floor upon death (Chami et al., 2019).

Next, using an open-source climate model called the Global Calculator (2021a), I find that the TLP would "cause emissions to fall so much that the concentration of carbon dioxide in the atmosphere is below pre-industrial levels (288 parts per million)." Since the calculator gives several sliders and asks users to put them on Level 1 (minimal abatement), Level 2 (ambitious), Level 3 (very ambitious), or Level 4 (extremely ambitious), I placed the sliders in order to best approximate the TLP. I placed several sliders at the lowest, "minimal" level, signifying no nuclear power and no geoengineering technologies such as carbon capture and storage technology. I allowed a 99% reduction in animal agriculture. Imagining a decentralized economy where self-reliant communities consume mainly what's produced locally, I input the minimum possible increase, 56%, in the distance that things are transported by freight worldwide. Envisioning an end to planned obsolescence and a move toward multi-use devices (that combine the functions of computers, phones, and game consoles), I picked the second-least available increase in the total number of devices, up from about 6 to 8.5 for each urban household.

The TLP involves a rapid abolition of fossil, nuclear and biomass energy sources and a socially just transition toward 100% renewable sources, primarily small-scale wind and solar power. I argued above that this transition can occur in under a decade, when combined with a rapid decline of total energy usage. The Global Calculator is not able to capture anywhere near such a rapid transition, but in order to approximate it as much as possible, I input a "very ambitious" increase in wind, a "very ambitious" increase in solar power and energy storage, and the "minimal" option, signifying virtually no increase, for hydroelectricity and marine power. As a result, total energy demand falls, in the Global Calculator's approximation, from 372 exajoules (EJ) in 2011 to 190 EJ in 2050, at which point 85% of energy comes from renewable sources, mainly wind and solar, and the remaining 15% coming from fossil fuels.

Although it slightly compromises the climate effectiveness of the pathway, I entered the greatest available increase, 45%, in passenger distance, to an average of 14806 kilometers a year. Since the long daily commute to the office will be a relic of the past, I imagine that people will use this increase in travel in order to explore the world at a leisurely pace on electric buses, bikes, trains, and sailboats, instead of cars and planes. As Soper (2020) notes, slower travel enables people "to enjoy sights and scents and sounds, and the pleasures (and benefits) of physical activity, and

experiences of solitude and silence, all of which are denied to those who travel in more insulated and speedier ways."

Based on UN Special Rapporteur Oliver De Schutter's (2011) finding that agroecological techniques can double yields in much of the Global South, I picked a Level 2 yield increase and a Level 3 land use efficiency increase. Given the documented failure of GMO agriculture, a global ban would not negatively impact total yield growth (Hakim, 2016; IAASTD, 2016). By contrast, conventional breeding has created high-yielding varieties of many crops (GM Watch, n.d). Moreover, organic and conservation agriculture can radically boost yields with crop rotations, multi-cropping, push-pull pest management, no-tillage, and continuous soil cover (Ponisio & Ehrlich, 2016).

I found that human population is not a decisive factor in the ability to achieve the 300 ppm target. If I input the United Nations' medium and high estimates of population growth, then a pre-industrial 288 ppm level is still achieved by 2100. I did choose the UN's low estimate, an increase to 8.3 billion people by 2050, since the TLP, if successful, would address and eliminate the major causes of global population growth—poverty and patriarchy (Roberts, 2018; Sen, 1999)—and would implement policies proven to simultaneously improve equity and decreased fertility, including improved education for girls and young women, ending child marriage, and increasing access to voluntary family planning (Wolf et al., 2021). Eileen Crist (2019) writes that in an anarchistic society with widely accessible family planning services and with women in charge of their fertility, "'Population control' will not only be eschewed but also unnecessary," since "most women will choose to have zero, one or two children." After all, children would no longer be born for reasons such as "old-age insurance, or to labor in sweatshops or agricultural fields, or to keep the economy growing, or to aggrandize the armies of nationalistic tyrants."

The Calculator does not offer a way to choose a starting date other than 2011, and so there are a couple options that could be taken to account for the TLP's 2025 starting date. One option is to postulate that the TLP's greater ambition cancels out the earlier start date of the Calculator's approximation. The Calculator still assumes 15% fossil fuel reliance and 1.3 million cars in 2050, whereas the TLP abolishes fossil fuel use and cars by around 2035. So, even though the Calculator's approximation starts the energy transition 14 years before the TLP, it finishes the transition more than 15 years later. It would be reasonable, therefore, to call it even. A more methodologically cautious option involves adding extra emissions to account for the Calculator's later starting date. The scenario in Global Calculator (2021b) adjusts the original scenario (Global Calculator, 2021a) in order to add back the business-as-usual emissions from the years 2011 to 2025. During this period, the Global Calculator only gives the emissions totals for the years 2011, 2015, 2020, and 2025. Assuming that emissions changes are linear in between those years, the total difference is 292 GtCO2. To approximate a relatively smooth transition, I added another 200 GtCO2. Thus, levers are adjusted in this model (Global Calculator, 2021b) so that the total emissions double from 492 to 984 GtCO2. The result is still an atmospheric CO2 concentration below 288 ppm.

Both the 2021a and 2021b scenarios lead to a rewilding of more than 75% of the Earth. The 2021a scenario results in 81% of the planet's ice-free and desert-free land becoming non-commercial forest and natural grassland. It is worth noting that restraining population growth and sprawl actually does not impact this percentage very much. Bringing population and urbanization levels from the most ambitious to the medium levels would only decrease the planet's wild areas from 81% to 79%. The 2021b scenario brings wild areas down just a couple percentage points further to 77%. Both the 2021a and 2021b scenarios reflect the calculator's conservative limits, since even the more ambitious 2021a scenario assigns 2% of the ice-free and desert-free land to pasture and biomass crop growth, whereas the true TLP would rewild this area, bringing total wilderness (including inhabited, tended wilderness) to 83% of the ice-free and desert-free Earth, or 88% of the planet in total.

Forces for System Change

For achieving the Total Liberation Pathway, I propose a resist-and-reconstruct strategy for systemic social change. The first component, drawn from Autonomist Marxist traditions, is the "refusal of work," important as a means of achieving the degrowth necessary for global energy and resource usage. The second component, taken from the IWW (2021), involves "forming the structure of the new society within the shell of the old." Organizing prefigurative productive structures—such as MakerSpaces, community farms, and horizontally-run cooperatives—will enable communities to meet their needs outside of paid employment. Following Kevin van Meter (2017), I view the main (human) agents of change as the broadly defined working class, including "slaves and peasants as well as students, homemakers, immigrants and factory and office workers." However, especially important roles must be given to Indigenous peoples' movements, which have been at the forefront of protecting and restoring the world's land, and to energy and agricultural workers, who control important bottlenecks in the global economy.

Indigenous communities have long been at the forefront of resisting ecological destruction (Hill & Antliff, 2021), and their reclamation of ancestral land will be essential for restoring the Earth's health. Even despite facing ongoing settler-colonial erasure, these communities have often managed to maintain relatively anti-authoritarian cultures and sustainable lifestyles. Areas controlled by Indigenous peoples, despite taking up only a quarter of the world's land, contain about 40% of "ecologically intact land" and a disproportionately high percentage of the planet's biodiversity (Garnett et al., 2018). A joint letter by Indigenous groups, while demanding the protection "of more than half the planet in a natural state," aptly insists that this proposal should "not mean the creation of more government protected areas, but rather fully and formally recogniz[ing] the rights and forms of governance of indigenous peoples over their territories" (Joint Declaration, n.d.).

Energy and farm workers also have a critical role to play. As Tadzio Müller (2013) argues, the energy sector is an especially important "point of leverage" on the global economy and is also a central factor in the climate and ecological crises. The agricultural sector represents another strategic focal point for the same reasons. Just 128 slaughterhouses are responsible for about than 90% of the cattle slaughter and deforestation in the Brazilian Amazon, comprising a "a bottleneck

in the livestock breeding chain" (Pegurier, 2017) in the meat industry in the country that slaughters the most cows. In the United States, the world's largest slaughterer of chickens (Sanders, 2020), slaughterhouses and meat processing plants also comprise a "critical bottleneck" (Corkery & Yaffe-Bellany, 2020). Regardless of whether populations choose to reduce their consumption, energy and agricultural workers' strikes can unilaterally reduce the availability of destructive energy and animal products. Moreover, the hazards of their jobs provide an incentive for refusal of work. Fossil fuel and biomass industry employees have far higher death rates per unit of energy production than workers in wind and solar industries. The death rate of coal workers is over a thousand times higher than that of solar energy workers (Ritchie, 2020). Slaughterhouse workers suffer "a variety of disorders, including post-traumatic stress disorder and the lesser-known perpetration-induced traumatic stress" (Newkey-Burden, 2018). Fossil fuel and slaughterhouse workers who walk off their hazardous and traumatic work can cause powerful declines in energy and animal product usage. Solidarity funds and other forms of outside support would assist such workplace actions, especially since many of the North's farm workers are undocumented immigrants facing extreme precarity.

There exist many promising examples of resistance-and-reconstruction that have taken on deeply ecological themes, such as the Transition Towns, Right to the City, Global Ecovillage Network, Mississipi's Cooperation Jackson, Mexico's neo-Zapatistas, Syria's Democratic Confederalists, and Sri Lanka's Sarvodaya Shramadana Movement. As communities shift their productive powers to alternative venues like Makerspaces, and as employees gain more control over the *means* of production, they can simultaneously decrease production (and production time) and implement more ecological *ends* of production. Some precedents include LUCAS Aerospace workers in the United Kingdom striking to produce renewable energy equipment instead of nuclear weapons, IWW and Earth First! -affiliated loggers in the United States demanding sustainable logging and opposing clear-cutting. More recently, the 2019 School Strike for Climate, children around the world skipped school and indicated that a livable future was more important to them (Klein, 2019). Since schooling can be understood as an apprenticeship for future employment, and as training to be productive members of a capitalist society, the school strike can be seen as a powerful and replicable form of class struggle.

Radical organizing has begun among global energy workers, many of whom do not want to work in dangerous fossil-fuel jobs, and some of whom do not want to work at all. Graeber (2011) describes French fossil fuel workers militantly struggling for an on-time retirement, or, in other words, "the right to stop being oil workers." In 2016, affiliates of Latin America's Trade Union Confederation of the Americas unanimously adopted an opposition to fracking. The following year, South Korea's Korean Power Plant Industry Union announced they "welcome the shutdown of worn out coal power plants because we are clear about what kind of country we want to leave for our descendants" (Trade Unions for Energy Democracy, 2018). When Spain committed to closing most of its coal mines in 2018, unions secured and celebrated an early retirement for miners over 48, and new livelihoods in ecological restoration and renewable energy for other employees (Nelsen, 2018). In 2021, the U.S. United Mine Workers announced they would accept a just transition from coal mining to renewable energy production (Scheiber, 2021). Iran's striking oil

workers have demanded more paid leave time (Debre, 2021), and winning this demand would likely result in less oil production per full-time worker.

La Via Campesina, a network of an estimated 200 million small farmers in 81 countries, can play a major role in a sustainable transformation of global agriculture. Their practice of agroecology and advocacy of local food production fit easily into the Total Liberation Pathway. Although they do not share the Pathway's commitment to abolish animal agriculture, there is still significant overlap; La Via Campesina (2018) opposes factory farming and insists that "we urgently need to reduce meat consumption" globally.

There would be backlash from not only from the capitalist establishment but also from far-Right forces including extreme speciesists and ecofascists alike. We can hope to win over some of their support bases by explaining the benefits of the Total Liberation Pathway: a drastically shortened and non-alienating workweek, a stable access to necessities, and a decent change for human and planetary survival. If the anti-Total Liberation factions are drastically outnumbered, then their opposition might not amount to much of a threat. They might crave and even demand more meat and energy usage, but they will lack coercive power to make people work in the slaughterhouses or in coal mines. Insofar as they insist on being violent toward living beings, militant responses might be appropriate and necessary: Blockades, lockdowns, house visits, de-platforming, tire slashing, arsons, and so on. If the Left can rightfully condone such tactics against far-Rightists, then it can also condone such tactics against propagators of omnicide.

Conclusion: Revolution with and for the Earth

Kevin Van Meter (2017) writes that everyday resistance comprises a "factor of revolution," directly challenging capital accumulation and creating conditions for more overt revolutionary struggle. Everyday resistance is already very common. John Holloway (2010) looks at such everyday rebels as an urban gardener, a group of friends who start a choir, a daydreaming employee, and a group of homeless squatters. Finding meaning outside of the work-and-spend cycle, at least for these moments, they "stop making capitalism." Holloway speculates, "There is nothing special about being an anti-capitalist revolutionary. This is the story of many, many people, of millions, perhaps billions."

Additionally, understanding nature and animals as fighting on our side, and us on theirs, can help us humans understand revolution as more feasible. As pattrice jones (2006) writes, "I do know that we are not alone in the struggle to save the earth. The sooner we see that and act accordingly, the sooner we can begin to end our own awful estrangement and help to heal those we have hurt." In 2003 in Zuzuland, a group of 11 elephants, led by a matriarch named Nana, rescued a group of antelope that had been captured for breeding. Nana undid the metal latches closing the gate, and stepped back to watch the antelope escape. A local ecologist told reporters, "Elephant are naturally inquisitive, but this behaviour is certainly most unusual and cannot be explained in scientific terms" (Sapa, 2003). In 2016, Ponyboy the pig and Johnny the sheep escaped in California and were found wandering together in the street. In 2017, Fred the goat escaped a New Jersey auction house, and he returned the next year to release dozens of goats and sheep. In 2018, a Polish

runaway cow found protection among a herd of wild bison. Such instances of animal resistance, and even of animals resisting together across species lines, are fairly commonplace and indicate that nonhuman nature will not accept compulsory work without a struggle (Colling, 2020).

Furthermore, if we understand rewilding landscapes to be a revolutionary act, then we can also understand the Earth and its self-rewilding ecosystems as revolutionary agents in their own right. A well-known illustration of this resilience involves the Chernobyl ecosystem's recovery since industry and agriculture abandoned the region after a 1986 nuclear meltdown (Barras, 2016). Abandoned farmlands across Europe are recovering with shrublands and forests returning (Rey Benayas, 2019) and sequestering carbon.

Whether or not the Total Liberation Pathway will be achieved, striving for it could raise the chances of human and planetary survival. If the aspired 288 ppm and >80% protection targets are not achieved, the more moderate proposed targets of 300 ppm and 75% protection targets might be. If that fails too, the more mainstream demands of 350 ppm and Half Earth might be met. And if colonial and authoritarian structures are not fully dismantled, then perhaps colonized and oppressed populations can seize more autonomy and land than they can currently access. Tight-knit and diverse communities might survive collapse, as envisioned by Octavia Butler (2019). At worst, we can at least go down fighting, playfully and joyfully, for a livable future.

Mainstream solutions to climate change often involve ongoing economic growth, through promises of full-time "green jobs" and high-tech geoengineering, and are unlikely to stop the present apocalypses of alienation and annihilation. By contrast, the Total Liberation Pathway proposes letting nature play, ourselves included. We need to step off the fast-paced "treadmill of production" and instead take a leisurely walk. We need to seize the "social factory" and turn it into a playground. We need to see and treat the world as fundamentally playful and our everyday lives as sacred and wild.

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