



The Impact of Scarcity on Pro-environmental Behavior in the COVID-19 Pandemic

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As the world contends with the far-ranging impacts of the COVID-19 pandemic, ongoing environmental crises have, to some extent, been neglected during the pandemic. One reason behind this shift in priorities is the scarcity mindset triggered by the pandemic. Scarcity is the feeling of having less than what is necessary, and it causes people to prioritize immediate short-term needs over long-term ones. Scarcity experienced in the pandemic can reduce the willingness to engage in pro-environmental behavior, leading to environmental degradation that increases the chance of future pandemics. To protect pro-environmental behavior, we argue that it should not be viewed as value-laden and effortful, but rather reconceptualized as actions that address a multitude of human needs including pragmatic actions that conserve resources especially during scarcity. To bolster environmental protection, systematic changes are needed to make pro-environmental behavior better integrated into people's lives, communities, and cities, such that it is more accessible, less costly, and more resilient to future disturbances.

Keywords: scarcity mindset, pro-environmental behavior (PEB), COVID-19 pandemic, climate change, environmental degradation, sustainability, hierarchy of needs

INTRODUCTION

The COVID-19 pandemic has upended lives and laid bare numerous weak spots of modern society. Healthcare systems have failed, supply chains have broken, and poverty and food insecurity are on the rise (Pereira and Oliveira, 2020; Solomon et al., 2020). As such, many forms of scarcity have been exacerbated by the pandemic, leaving millions of people with insufficient resources to maintain a certain standard of living. The most poignant type of scarcity during this pandemic is the scarcity of physical resources, such as food and medical equipment, as well as financial scarcity due to a weakened economy. However, the pandemic has also resulted in a scarcity of cognitive resources, causing a notable neglect of environmental issues such as climate change and plastic pollution, which are relegated to a lower level of concern. In other words, the pandemic has imposed a form of cognitive scarcity on environmental issues that also deserve attention. This change of priorities is illustrated in the precipitous drop of climate-related media coverage at the onset of the pandemic in some countries (Medium., 2021), which had been increasing steadily in the preceding years (Barouki et al., 2021).

Although this attentional shift might seem intuitive given all the pandemic-induced socio-economic disruptions that have taken place, it may be ultimately counterproductive because environmental degradation could lead to future pandemics. Scientists have for years warned of the connection between disease outbreaks and anthropogenic environmental change such as climate change and habitat destruction (Weiss and McMichael, 2004; Barouki et al., 2021), and how ignoring this connection could set the stage for future pandemics and natural disturbances more generally.

The COVID-19 Pandemic's Impact on the Environment

A recent SDGs report shows that the world is off track to meet the goals toward environmental sustainability (United Nations, 2020). Most countries are not meeting their commitments to limit greenhouse gas emissions, to improve urban environments by reducing the number of people living in slums, increasing access to public transport, and reducing air pollution. Efforts toward sustainable and inclusive economic growth, energy provision, and infrastructure development have all been falling short during the COVID-19 pandemic (The Lancet Public Health, 2020).

Perhaps the most significant adverse environmental impact of the pandemic has been the astronomical increases in plastic waste generation (Silva et al., 2021), the effects of which are being observed already on coastlines (Chowdhury et al., 2021), wildlife (Hiemstra et al., 2021), and cities which are reporting increases in littering (Ammendolia et al., 2021; Time, 2021). Years of declines in plastic waste have been reversed during the pandemic due to increases in disposable personal protective equipment (Adyel, 2020; Benson et al., 2021). While it's necessary to use single-use plastics in some healthcare settings, a secondary impact of the pandemic has been an overall increase in plastic waste as restaurants have shifted to a takeout model or grocery stores ban the use of reusable bags (Vanapalli et al., 2021). To clarify, the point made here is not that the policy itself is problematic—communities should act in accordance with local health guidelines—rather, the issue is that our reliance on single-use plastics is a convenient fallback during the pandemic. On the other side of the plastic waste cycle, cities have cut recycling programs as budgets tighten due to pandemic responses (Waste Dive., 2019; PBS, 2021). This is further compounded by an increase in oil companies' investment in the production of virgin plastics, citing the reduced demand for recycled plastic products (Reuters, 2020).

THE SCARCITY MINDSET UNDER THE PANDEMIC

In addition to the health impact, the COVID-19 pandemic has presented a sudden perturbation in many aspects of people's lives. According to a recent report from the World Bank, the COVID-19 pandemic is estimated to push as many as 150 million additional people into extreme poverty, defined as living on less than US\$1.90 a day, by 2021 (The World Bank, 2020).

It is estimated that during the first three quarters of 2020, nearly 500 million full-time jobs were lost worldwide due to workplace closures (International Labour Organization, 2020). In North America, 46% of Canadians reported being stressed financially (Gadermann et al., 2021), 52% of US adults say they have experienced negative financial impacts due to the pandemic (American Psychological Association, 2020), and 51% of US adults reported that the pandemic has made it harder for them to achieve their financial goals (Pew Research Center, 2021). Local COVID cases and deaths present an immediate health threat and lockdowns and travel restrictions present a threat to social relationships. The financial, health, and social threats may trigger an enormous sense of worry and concern, drawing attentional resources to the threats and creating what has been termed a scarcity mindset.

The Scarcity Mindset

Mullainathan and Shafir (2013) define scarcity as “having less than you feel you need” (p. 4). This could apply to many domains, though most commonly to financial scarcity. The idea of a scarcity mindset builds on research within cognitive psychology and behavioral economics, stating that scarcity acts like a cognitive load which affects many fundamental cognitive functions like how people think, reason, and decide. For instance, financial scarcity has been shown to impair cognitive performance on tasks measuring fluid intelligence and executive function (Mani et al., 2013). Financial scarcity also highlights an economic dimension to everyday experiences where thoughts about costs and money are top of mind (Shah et al., 2018) and price information captures visual attention away from opportunities to save (Zhao and Tumm, 2017). Other studies have suggested that perceiving scarcity might impact cognitive self-control where immediate needs become more salient than future ones (Cannon et al., 2019). This may result in several non-normative decisions from an economic or longer-term perspective (Zhao and Tumm, 2018), such as lower saving rates and greater debt accumulation, which may be why much of the work on the scarcity mindset has focused on participants from a lower socioeconomic background. Yet, this increased focus on short-term incentives has also led to better performance on other tasks. For example, people under financial scarcity exhibit greater price sensitivity, and are less likely to be fixated on proportional gains at the expense of absolute quantity (Shah et al., 2015; Frankenhuys and Nettle, 2020). That is, people under scarcity are equally likely to value saving 50% of \$100 and saving 5% of \$1000.

Despite what the literature may suggest, it is worth pointing out that scarcity is not synonymous with poverty. Rather, as a recent review by de Bruijn and Antonides (2021) notes, “not all low-income individuals experience feelings of having less than they need” and conversely, being objectively well-off is not an inoculation against perceiving the burden of scarcity. In other words, there is a conceptual divergence between being poor and feeling poor—a distinction not always clear in the literature. For most people, regardless of their level of income, scarcity may be a constant hum in the background guiding and constraining their thinking throughout much of their lives.

The Pandemic Increased Scarcity

The COVID-19 pandemic has turned that background hum into a roar for many of us. As a direct consequence of the pandemic and the subsequent lockdowns, scarcity of resources and time has become a hallmark of our lives (Hamilton, 2021). Lockdowns, designed to slow virus transmission, were intended to and were effective at lowering the burden on medical facilities. This led to a scarcity mindset in at least three ways: (1) by highlighting the limited healthcare resources available (i.e., the number of hospital beds available), (2) by inflicting an actual economic cost on people, which reverberated through the society as restaurants, bars, and other non-essential services closed down for weeks or even months in some cities, and 3) by inflicting an emotional cost on people via border closures that prevented families and friends from physical reunions (Solomon et al., 2020; Civai et al., 2021; Echegaray, 2021).

These factors disproportionately impacted lower-income countries, which often were unable or unwilling to monetarily compensate for the economic loss of the lockdowns, and communities of color who have less reliable access to healthcare and may be more affected by the closures of physical business due to systemic inequities in digital access (Mahmood et al., 2020). Further, labor shortages and outbreaks at factories and processing plants had wide-ranging impacts on supply chains leading to empty shelves at previously abundant grocery stores. The characteristic image of people hoarding toilet paper at big box stores is iconic because consumer goods that were taken for granted before the pandemic were suddenly in short supply. Of course, the impact of a dearth of consumer goods vs. a hospital bed or canisters of oxygen is incomparable and unevenly distributed over race, class, and socio-economic status. The psychological impacts of scarcity caused by the pandemic were similarly unevenly felt but still widespread and far-ranging.

SCARCITY IMPACTS PRO-ENVIRONMENTAL BEHAVIOR

The scarcity mindset can also have profound implications on pro-environmental behavior. Here we define pro-environmental behavior as any action that can potentially mitigate environmental degradation or increase awareness of environmental issues. As described earlier, perceptions of scarcity result in myopic thinking and foregoing future needs in favor of satisfying present constraints (Shah et al., 2012; Zhao and Tumm, 2018). However, environmental damage often occurs over a broad spatio-temporal horizon, which reduces motivation for sustainable choices via scarcity-induced myopia (van der Wal et al., 2018). Further, environmental sustainability also requires collective actions and cooperation within and between communities. Resource scarcity and the perception of scarcity, on the other hand, have been shown to reduce cooperation, increase ingroup preference and outgroup ostracization (Herzenstein and Posavac, 2019). Recent findings suggest that cooperative social norms which have arisen in times of plenty may dissolve when financial resources are scarce, and competition for those resources fierce (Nhim et al., 2019). However, not all types of

scarcity have the same impact on cooperation. For example, in one study, farmers acted more cooperatively to conserve water during times of water scarcity (Nie et al., 2020). In another study, scarcity of social interactions during the current pandemic increased people's willingness to cooperate with public health measures (Civai et al., 2021).

Other empirical work suggests that the scarcity mindset may curb willingness to engage in pro-environmental behavior (Sachdeva and Zhao, 2020). In a hypothetical shopping task, participants were given a choice between purchasing sustainably made consumer goods vs. conventionally sourced ones. They were more likely to choose the conventional products when in a scarcity mindset (i.e., not having enough money). Participants in an abundance mindset (i.e., having enough money) preferred the sustainably produced products, even when controlling for price. This work suggests that scarcity deters people from engaging in pro-environmental actions, presumably by devoting attention to the financial problem at hand and diverting attention away from environmental causes. This said, natural resource scarcity (e.g., water scarcity) can promote choices of sustainable products (Sachdeva and Zhao, 2020).

Threat perception, which draws tremendous attentional resources, can explain why people experiencing financial scarcity forgo environmental values and actions during the pandemic. Threats experienced during the pandemic elicit a high level of worry. Since the emotional capacity to worry is thought to be finite (Capstick et al., 2015), being worried about the pandemic can cause less worry about other things, such as the environment and climate change (Sisco et al., 2020; Botzen et al., 2021). To summarize, scarcity caused by the pandemic can be one of the factors that contribute to the environmental degradation during the pandemic.

PRO-ENVIRONMENTAL BEHAVIOR RECONCEPTUALIZED

To some extent, these findings on scarcity curbing pro-environmental behavior are counter-intuitive. Some pro-environmental actions inherently conserve financial resources (e.g., those that reduce waste, promote reuse, and minimize reckless consumerism) and in times of economic crisis, this appears, *prima facie*, to be reason enough to reduce waste and overconsumption (Vox., 2020). Why then, as previous research suggests, are people under scarcity unwilling to engage in pro-environmental behavior?

One explanation is that the unwillingness may arise from the traditional conceptualization of pro-environmental behavior in the broader psychological literature. Since at least the mid-1970s, pro-environmental behavior has been conceptualized as driven by higher-level needs, and are often value-laden and effortful (Dunlap, 1975; Stern et al., 1999). Consider **Table 1**, showing an early version of (Maslow, 1954 theory on the hierarchy of needs. In the original formulation of this hierarchy, the satisfaction of more fundamental needs such as physiological needs for food, water, and shelter, can lead to the pursuit of higher-order needs. At the highest level, self-actualization and transcendence needs

TABLE 1 | Pro-environmental behaviors that satisfy each level of needs based on Maslow (1954) motivational theory on the hierarchy of needs.

Hierarchy of motivational needs (in descending order)		Types of pro-environmental behavior that may support each need
Self-actualization	– Altruism	– Support vulnerable communities
	– Pro-sociality	– Educate and inspire future generations
	– Goal pursuit and achievement	– Engage in activism
		– Donate to environmental organizations
		– Become a champion in environmental sustainability
Esteem	– Social prestige	– Engage in conspicuous consumption
	– Social recognition	– Use public praise and recognition to promote energy conservation
	– Legacy concerns	– Use legacy motives to increase pro-environmental actions
	– Freedom of choice	– Self-educate on environmental issues
	– Competence	
Love and belonging	– Community membership	– Engage in environmental stewardship; support parks and conservation areas
	– Social stability and support	– Engage in constructive dialogue on environmental issues; reduce polarization on climate change
	– Leisure and relaxation	– Visit parks for nature connectedness and mental well-being
Safety		– Promote urban green spaces and access to nature
	– Financial security	– Reduce consumption (e.g., frugality)
	– Energy security (e.g., energy independence)	– Reduce reliance on the grid; transition to renewables (e.g., solar panels)
	– Safe home environment and buffer from disasters	– Employ mitigation measures to protect homes (e.g., vegetation management in wildfire prone areas)
Physiological	– Food security	– Consume locally grown food
	– Physical health	– Get out to nature for clean air and health benefits
	– A place to live	– Reduce carbon emissions to reduce air pollutants (e.g., eat less meat, drive less, fly less)
	– Access to clean water and air	– Reduce water consumption; avoid single-use plastics to reduce water pollution
	– Sufficient food	– Reduce food waste; buy sustainably grown food

Self-actualization needs are at the top of the hierarchy and physiological needs are at the bottom.

are thought to drive pro-environmental behavior that yields benefits beyond the self. Note that we are not suggesting a reliance on (Maslow, 1954 specific rank order of needs, nor are we indicating agreement with his seeming belief in these needs mirroring stages of maturity or human development (Maslow, 1967). Rather, we argue that this is not only an inaccurate depiction of why people engage in pro-environmental behavior, but makes pro-environmental behavior seem out-of-reach and inaccessible for many people. Particularly, in times of scarcity, there are other pathways to sustainability that do not depend on higher-order needs. Emphasizing these distinct pathways, satisfying a multitude of human needs, may help reconceptualize pro-environmental behavior more broadly and bolster environmental protection as the world faces increasingly severe natural disturbances (Table 1).

For instance, reducing energy consumption also reduces energy bills and financial stress, in addition to being pro-environment; and reducing vegetation and debris around a house can help protect the house from wildfires and also limit their spread (Olsen et al., 2017). In other words, although most pro-environmental behavior has been value-driven (Corraliza and Berenguer, 2000; Liu and Guo, 2018), there are many pragmatic reasons to be pro-environmental (Sachdeva and Zhao, 2020).

Moreover, as experiences and perceptions of scarcity lead to an increased emphasis on the more foundational physiological and safety needs (Yuen et al., 2021), pro-environmental behavior that is better aligned with these lower-level needs may become easier to adopt.

PROTECTING PRO-ENVIRONMENTAL BEHAVIOR

The perspective that we have put forward in this piece stems from an observation in the early days of the COVID-19 pandemic. In the midst of all the other pain, suffering, and loss experienced by millions across the world, the looming (and present) impacts of climate change were relegated to a lower rank of priorities (Medium., 2021). To some extent, this demotion of environmental concerns may have seemed justifiable—after all, millions of people are suffering right now. Yet, as researchers raising the alarm about the increase in plastic waste have said, if pro-environmental behavior is demoted during these disturbances, we are only creating more dire future scenarios and trading one crisis for another (Vanapalli et al., 2021). Scientists have been sounding the alarm for years that anthropogenic

environmental degradation could lead to more frequent and deadly future pandemics (Weiss and McMichael, 2004; Barouki et al., 2021). For example, the destruction of natural habitats tends to drive wildlife out of their original living space and into contact with humans, thus increasing the risk of animal-to-human disease transmission (Roe et al., 2020; McNeely, 2021; Pelley, 2021). Furthermore, anthropogenic climate change could directly lead to deadlier future pandemics, as many diseases spread faster (Carlson et al., 2021) or expand their range and active season under higher temperatures (Curseu et al., 2010).

The path to mitigating these disturbances may rely on systemic change, which the COVID-19 pandemic can help catalyze (BBC, 2020; Saiz-Álvarez et al., 2020; Stanford Social Innovation Review, 2021). Nascent research already suggests that the COVID-19 pandemic has disrupted materialism (Briggs et al., 2020; Mehta et al., 2020) and increased people's desire to engage with nature during the lockdown (Robinson et al., 2021; Johnson and Sachdeva, under review¹). The latter in particular has been demonstrated to promote cooperation and act as a gateway to future environmental action (Zelenski et al., 2015). To make nature more accessible to as many people as possible, cities should continue to invest in green infrastructure as many have already done as part of social distancing protocols (Hanzl, 2020; Kleinschroth and Kowarik, 2020). Integration of green spaces into cities can be rethought as a tool to restore and promote mental health (Roe and McCay, 2021), since mental health has been severely impacted by not only the pandemic (Usher et al., 2020) but climate change and environmental crises (Berry et al., 2010; Afifi et al., 2012; Clayton, 2020). Furthermore, evidence suggests that if people are more future-oriented, scarcity can reinforce pro-environmental behavior, such as conserving water (Gu et al., 2020). Early education promoting civic participation and participatory governance may be an important resource in fostering a sustainability and future-oriented culture (Bäckstrand, 2003), which can ultimately transform scarcity into a driver of pro-environmental behavior, as opposed to a stressor.

¹Johnson, M., and Sachdeva, S. (under review). The multi-faceted impact of COVID-19 on social media users' wellbeing and relationship with urban nature. *Front. Sustain. Cities*.

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Other institutional interventions on urban planning can ensure that pro-environmental actions are easier to execute in daily life and do not present an additional cognitive load for people. This includes investing in robust and convenient recycling and composting infrastructure and programs, more convenient public transportation, and subsidies for sustainable products. These measures should make pro-environmental behavior better aligned with scarce conditions so that the decision to behave sustainably is no longer a tradeoff between current needs and future needs. As noted earlier, scarcity, real or subjective, captures our attention often resulting in narrow, present benefits at the expense of future or more abstract gains. As Morton (2017) notes, if a behavior becomes habitual and in the service of current needs, it is more likely to persist even under scarcity. The micro and macro-level interventions suggested by the literature reviewed in this piece require significant investment and are difficult to implement in the best of circumstances. However, the pandemic offers a chance to make these substantial changes so that our societies, mindsets, and the environment itself become more resilient in the face of future disturbances.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

SS and JZ conceived the framework of this paper. SS did the majority of the writing. JW wrote portions of Scarcity Impacts Pro-environmental Behavior, Pro-environmental Behavior Reconceptualized, and Protecting Pro-environmental Behavior sections, and made **Table 1**. JZ did the majority of editing. All authors contributed to the article and approved the submitted version.

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