

v1: 3 April 2024

Commentary

An Individual Decision-Making Model for Taking Climate-Friendly Action

Peer-approved: 3 April 2024

© The Author(s) 2024. This is an Open Access article under the CC BY 4.0 license.

Qeios, Vol. 6 (2024)
ISSN: 2632-3834

Robert Aunger¹

1. Department for Disease Control, London School of Hygiene & Tropical Medicine, University of London, United Kingdom

Experts are concerned about the impending arrival of tipping points in the global climate's ability to accommodate increasing levels of CO₂ and methane in the atmosphere, at least partly due to human activity. The resulting environmental degradation and loss of biodiversity are likely to be devastating to civilized ways of life. This paper presents an individual-level decision-making model that can alleviate some of the cognitive paralysis that results from being faced with such a global-scale existential crisis as but one individual among billions. It achieves this by simplifying and organising the kinds of trade-offs that are required to identify the individual's most productive course of action from among many alternatives. Choices between whether to engage in forced choice over organisational practices they might control (e.g., a business mission) versus social influencing (e.g., via a social media presence) versus changes in lifestyle are central. It shows that those with control over the behaviour of others will likely bear greater responsibility. Easier decision-making should increase levels of pro-environmental activity.

Corresponding author: Robert Aunger,
Robert.aunger@lshtm.ac.uk

Introduction

Experts have been claiming that the world is heading toward a climate crisis since at least the 1950s. However, little has happened to slow the rate of environmental degradation up to now. There was a short respite to worsening climate trends during the COVID pandemic, but most trends seem to be getting back to their pre-COVID rates – for example, greenhouse gas concentrations continue to rise to record highs, and fossil fuel emission rates are now above pre-pandemic levels (Organization, 2022). A recent United Nations report argues that there is now “no credible pathway to 1.5C [above pre-industrial levels, the minimum average global temperature rise to prevent the worst effects of climate breakdowns]” (Programme, 2022). Current pledges by national governments for climate action by 2030, even if delivered in full, will mean a rise in global temperature of around 2.5C, likely to result in catastrophically extreme weather patterns around the world. The global failure to reduce carbon emissions means the only way to limit the worst impacts of the climate crisis is through a “rapid transformation of societies” (Programme, 2022). Whilst the warming of the atmosphere by itself results in severe risks for our future, the situation is further complicated by a number of other, often inter-related, domains. We may already be close to

several environmental ‘tipping points’ – that is, points in time at which some environmental process reaches a cut-off beyond which reversal to a more sustainable future is lost. Examples include the collapse of Greenland’s ice cap (producing rising sea levels), coral reef die-off, shifts in ocean currents (which disrupt rain patterns), or the abrupt thaw of carbon-rich Northern permafrost (Armstrong McKay et al., 2022). We had our chance to make incremental changes, but that time is over. Only systemic transformations of our economies and societies can now save us from accelerating climate disaster.

To avert catastrophe, what is needed is the achievement of what some are calling ‘social tipping points’ (Otto et al., 2020).¹ Examples include the Arab Spring or #MeToo movement (Juhola et al., 2022). In fact, it is probably too late for gradual social change to reverse many current environmental processes; we have lost that option due to prior inaction. What is required now is that we counter the loss of these *environmental* tipping points with interventions to produce *social* tipping points. Large-scale shifts are required to overcome the general inertia in time, but these can be triggered by specific kinds of forces targeting particular processes contributing to the climate crisis. Examples include eliminating all subsidies for fossil fuel production, introducing changes to building codes (to promote the use of eco-friendly construction), or financial divestment from fossil-fuel-promoting institutions (Otto et al., 2020).

Further, since we are already in the midst of significant changes in climate, we should be emphasizing not just *mitigation* – that is, accentuating the need to take action to avoid worse futures – but *adaptation* – which is getting people used to the idea that we will have to find ways to live in a changed world. Since it seems unlikely that we can avoid a number of the consequences of our past and current anti-environmental practices – even in the most sanguine forecasts – that means we have to make ready for significant changes to our way of life. So both mitigation and adaptation need to be considered.

Nevertheless, many individuals would like to make a difference. But how can one person influence global-scale trends that have been escalating for generations? Phrasing the question in this way makes it clear that it is entirely reasonable to become paralyzed by the difficulty of choosing which lifestyle changes are most needed. The scale of the problem can lead to a perception of psychological distance from any possible solution (Keller, Marsh, Richardson, & Ball, 2022; Weber, 2006), which leads to anxiety (Clayton, 2020; Whitmarsh et al., 2022). This anxiety can serve, in turn, as a source of ‘eco-paralysis’ (Albrecht, 2011; Toivonen, 2022), a condition inhibiting people from taking effective action in the face of the climate crisis, despite a willingness to do so. When it is perceived that no one is doing very much, and governments are failing to set or achieve targets, the problem can come to seem intractable (Xiang, Zhang, Geng, Zhou, & Wu, 2019).

Even when the desire to make a contribution is there, it can be difficult to determine what line of action should be taken to have maximal impact. Should I recycle my rubbish or attend a protest? Often one is left with the sense that the only choice is just to do the one thing one cares about most. But this may not actually achieve much. How can we help individuals to avoid concluding that analysis and action are futile?

To reduce the likelihood of going down the inexorable road to debilitating paralysis, or the tendency to just do what seems easiest, people can be empowered by a sense that they can make a difference. What might help people reach this conclusion is a decision-making model for climate action. Such a model could help people figure out what one can, or should, do to make the biggest difference possible – in effect, to reduce the possibilities to a few weighted probabilities. Previous decision-making approaches have focussed on how specific classes of decision-makers make climate-related decisions (e.g., government officials (Rickards, Wiseman, & Kashima, 2014), or agriculturalists (Brown, Alexander, Holzhauer, & Rounsevell, 2017)), or how individuals might be convinced they have a duty or collective responsibility to contribute to pro-environmental efforts (Fragnière, 2016; Hormio, 2023), or to examine how individuals might decide to migrate in response to climate changes (Nabong et al., 2023, #89182), or how global climate models might be improved to facilitate policy decisions (Weaver et al., 2013), or how particular psychological features play a role in decision-making (e.g., emotional responses (Davidson & Keciński, 2022), or hearing stories (Dillon & Craig, 2022)), or how

decision-making by particular kinds of organisations might be modelled (e.g., businesses (Linnenluecke, Griffiths, & Winn, 2013)). No previous model has concerned how everyday individuals might voluntarily decide among various possible pro-environmental actions to help achieve social tipping points. The closest predecessor is over a decade old, a review article, not a modelling effort, and one which expressed the need for changing people’s perceptions of their capacities and efficacy (Wolf & Moser, 2011). I propose to present such an individual-level decision-making model that can alleviate some of the indecision and cognitive paralysis that results from being faced with a multi-dimensional, global-scale existential crisis as but one individual among billions – without the intent to make people feel they *must* do something or consider themselves as traitors to the planet (as often their contribution to the problem will, in fact, be small). The rest of this paper is involved with developing, and then describing the use of, such a model (see Aunger, 2023 for additional details).

A model of climate-related decision-making

The model (see Figure 1) is best examined from left to right. Contextual factors that could influence decision-making occupy the left-most box. They feed causally into the individual’s psychological processes, which in turn determine their behaviour. The consequences of this behaviour can be influenced by intermediary factors before manifesting as an impact on climate, when considered at an aggregated scale.² These ‘bare bones’ of the model are very straightforward and can be fleshed out for specific situations with the addition of information about specific factors and options.

I note that there are essentially four different routes through the decision-making process. First, one can engage in *personal* action that influences a climate-related process as the proximate consequence of that action. Second, the individual can take advantage of having power over some aspect of a system (e.g., when that system is a company and the individual owns that company) whose functioning has an impact on climate. This requires the individual to have *controlover* the system as an intermediary process. Third, there is *influential* action, in which the action is designed to persuade others in the individual’s social network, such that they, in turn, do something that has an impact on a climate-related process. The fourth option is to do something unrelated to climate (the ‘opportunity cost’ option), such as exercising or watching a movie.

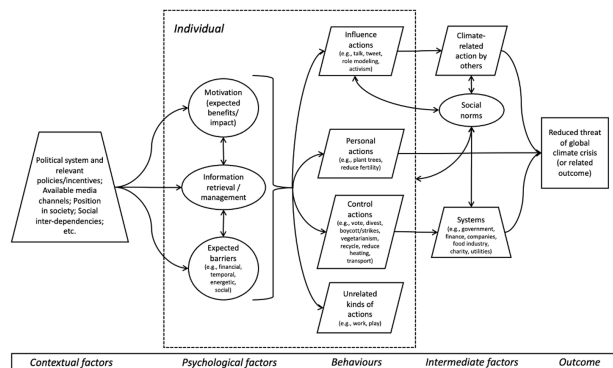


Figure 1. A climate crisis decision-making model

To see how the model helps direct decision-making, I discuss each of these kinds of action in turn, and then other aspects of the model. I note that people do not need to know about or deal with the model directly when making their decisions – they just need to be led informally through a consideration of the three different classes of behaviour that could be chosen.

Contextual factors

First, there are contextual factors to consider, taken by our model to be initial conditions, hence placed at the beginning of the causal chain, on the left side of the diagram. Not everyone is in the same situation, so their choices can rationally be different. Contextual factors can influence which of the three kinds of action makes most sense for someone. They also tend to reduce motivation, or to be paralysing.

For example, an important consideration is whether an individual has access to the institutions that enable certain kinds of actions, such as finance, media, or utilities. On the other hand, the government may have put in place policies or regulations that incentivize certain kinds of actions, such as subsidies for the installation of solar panels or rubbish recycling programs. In certain cases, behavioural choices may be foiled by the inability of the mediating institution to make them happen. For example, it may be very difficult to obtain certain kinds of food to support dietary decisions due to inefficiencies in the food production and distribution systems.

Inter-dependencies

There is also a special kind of contextual factor that I have not yet mentioned, which makes decision-making even more complicated. These factors involve a number of ways in which one person's decision depends on that of others. Unfortunately, these inter-dependencies do not make decisions easier either.

Who's responsible?

First, many will feel that it is the job of group-level actors in society – like government, and perhaps big tech companies –

to find climate solutions (Wiedmann, Lenzen, Keyßer, & Steinberger, 2020). This is a position that would help someone abdicate from the need to make any decisions at all. But the evidence from the past is that governments are not taking sufficiently serious action (e.g., COP26/7). A few are making promises, but then not keeping them (e.g., the Paris Agreement, or paying 'loss and damages' to the Global South). Similarly, technological innovations may arrive, but cannot be relied upon, as there is some serendipity to the identification and production of new solutions. Incentives (like profit) need to be in place, and often aren't. Nevertheless, new tech innovations may be required, as almost half of the emission reductions required to reach global net zero may need to come from technologies that are currently at the demonstration or prototype stage (IEA, 2021).

Money isn't lacking, as it actually makes economic sense to change course toward renewable energy sources, which are becoming cheaper to produce and use than fossil fuels. In the future, there are also likely to be higher levels of employment in clean energy industries than in fossil fuels (IEA, 2022). Health benefits will derive from relying on clean energy and improved diets. Even social inequality might be reduced if investments are made in public transport and more efficient homes. The crucial bottleneck is socio-political will.

Further, the COVID experience shows that huge changes in ways of living and working can be generated very quickly. At least in the face of immediate danger, governments acted, and often very strongly. Unfortunately, the climate crisis is a slow burn, with consequences only arising in the 'distant' future, beyond the political horizon (i.e., current election cycles). As a consequence, actors in government don't see an incentive to spend resources to prepare for, reduce, or even mitigate against the worst impacts of climate change. Bottom-up social movements will be needed to force governments into action that will rescue the situation.³ But that leads to the next problem.

Social dilemma

There is also the fact that individuals are being asked to make personal sacrifices, reducing their quality of life, when those around them may not change their behaviour – even though, to have an impact, everyone must participate. That is, *climate change is a social dilemma* (Barrett & Dannenberg, 2016). If not enough people change behaviour, then no dent will be made in the problem, and little value will attach to the sacrifices made. The end-goal can only be achieved if a large majority of people make a contribution, but there are incentives for any given individual to free-ride on the actions of others, and 'defect' from their responsibility. This logic works for everyone, so there is no incentive for anyone to be the first to take action. Here, inter-dependency creates immobility.

So someone must start the process. But who? One answer comes from our consideration of the next inter-dependency.

Fairness

This is the issue of fairness. A gradient exists in which those with greater wealth tend to have larger 'carbon footprints' (Nielsen, Nicholas, Creutzig, Dietz, & Stern, 2021). Indeed, the disparity really centres around the top ten percent of society, as these individuals tend to have huge carbon footprints, meaning they account for half of global emissions (Gore, 2015; Wynes & Nicholas, 2017). Even more impressively, the world's richest one percent, about 63 million people, account for double the carbon dioxide emissions of the world's poorest 3 billion (Oxfam, 2021). A big portion of this difference is due to travel modes and distances (Oswald, Owen, & Steinberger, 2020). The rich have additional impacts on emissions through their roles as investors, role models, and organizational participants, all of which they also tend to have outsized influence over, and which therefore marks them out as major drivers of climate change (Nielsen et al., 2021). On the other hand, individuals in the bottom 50% of global wealth already live within their 2030 carbon budgets per the Paris Agreement's goals (<https://www.bloomberg.com/graphics/2022-wealth-carbon-emissions-inequality-powers-world-climate/>).

At the same time, the *consequences* of climate change are also disproportionately inflicted on those who have not contributed to the problem and who are least able to cope with additional burdens: the poor, disabled, and marginalized (Islam & Winkel, 2017).⁴ This makes the current situation seem doubly unfair.

Personal actions

Keeping in mind any thoughts about context, we can now begin to think about types of actions. A few have a direct impact on the environment. For example, a positive personal action is to plant some trees to decrease CO₂ in the atmosphere (Waring et al., 2020). A 'negative action' is to have fewer children (Wynes & Nicholas, 2017), although most of the effect of that decision won't occur until it's too late (as the child grows older). However, most actions fall into the other two categories, as we will see.

Control-based actions

The second class of actions involves an individual's ability to *control* the actions of others. This typically requires the individual to have some sort of power over others – in effect, being able to compel conformity with one's intentions. This is often because one has some role in an institution (or, more broadly, 'system' in the model), and hence can control that system's activities to some degree. For example, you might currently invest money in stocks or a bank that in turn invests in climate-damaging activities. The financing of eco-destructive activity is rife (Gutiérrez & Gutiérrez, 2019). If you can force an organisation over which you have some control to engage in more sustainable practices, you could do that too – e.g., if you sit on the board of directors or are a member of a worker's union, make your voice heard, or remove your capital

from it. That might be the best single thing you can do (Griffin, 2017).

But in order to make actual choices about which action might have the biggest impact, any consideration must be fleshed out with empirical information about the psychological costs and benefits, and their relative 'weight' in terms of causal influence over the systems involved for a given individual. A first step is to look at one's 'carbon footprint' (although this is a limited perspective favoured by the fossil fuel industry). It's relatively easy to figure out the best way to have an impact on carbon emissions through control actions. Just Google 'carbon footprint calculator' and a variety of applications will be offered by organisations to lead you through the calculations, for free, on-line (although all are not equally trustworthy or accurate). Behavioural options can be ranked by their impact on CO₂ emissions – a handy, objective measure of impact on climate (although not inclusive of all aspects of impact). The most significant three options globally (at an individual level) are regulating building temperature (heating/cooling by electricity/gas), reducing car and air travel, and adopting a meat-free diet (Ivanova et al., 2020; Wynes & Nicholas, 2017). So certainly one can elect to reduce air travel, use electric cars, limit meat intake (particularly beef), and switch to an eco-friendly gas/electric supplier.

However, control as an individual is often fairly slight. With respect to government, for example, it is typically limited to donations to political parties and voting. Similarly, food choices (e.g., vegetarianism) can be seen as a boycotting of certain kinds of food production systems (e.g., the meat industry), although the degree of power over such large institutions from one individual's food choices is again small.

Unfortunately, as noted earlier, not enough people are doing enough personal or control actions to observe 'bends in the trends'. Motivation based strictly on this kind of calculus – individual actions, with an expectation of some effect on ecological factors – doesn't appear to be sufficient to cause enough people to take the plunge into pro-environmentalism. Extra motivation must be found. Further, many studies show the importance of emotion as a predicate to action, but – in common with other areas of behavioural science – the link between intention and actual behaviour tends to be weak for pro-environmental behaviours (Carrus et al., 2021; Frick et al., 2021; Hall, Lewis Jr, & Ellsworth, 2018). This is a major caveat to thinking that increasing motivation alone will solve the problem. Eco-behaviour change does happen when personal costs are low, and environmental benefits are known to be significant (Wyss, Knoch, & Berger, 2022) – or as our model would suggest, when expected barriers are minor compared to the level of motivation, given the information available to that individual. So making it easier to be eco-friendly, as well as demonstrating the benefits of that behaviour in terms people can understand, might have some effect.

But note that the outcome of the carbon footprint calculation will often say something like, 'At your current level of consumption, we would need 4.5 Earths to sustain your level for everyone'. This implies that not only must one reduce one's consumption by a significant amount, but one must

convince a number of other people to take similar steps before the current human population becomes sustainable on the one Planet Earth that we have. It is to this kind of action that I turn next.

Influence-based actions

A third course of action is to attempt to *influence* the behaviour of others. Influence requires complicity from those being influenced to be effective. Even if control isn't possible, one can attempt to leverage a personal relationship, or the social capital invested with particular others in one's social network (i.e., 'calling in a favour' or "Do it for me"). Alternatively, and less personally, one can often suggest or attempt to persuade others to engage in eco-friendly action (e.g., through logical argument or emotional appeal).

Often, the extra influence on someone else's decision-making is normative pressure – the expectation of some form of punishment (e.g., censure) or reward (e.g., praise) from other individuals for (not) conforming to pro-environmental expectations (Nolan, 2021). Social norms have consistently been shown to bear on climate mitigation behaviours in a number of important domains: eco-friendly consumer choices, energy conservation, reduction/reuse/recycling, sustainable food choices, and water conservation (Cialdini & Jacobson, 2021). A large cross-cultural study showed that people with strong concerns for connection with other people, and with strong altruistic leanings – i.e., those who might be called 'norm sensitive' – are more likely to express pro-environmental values (Duff, Vignoles, Becker, & Milfont, 2022). Indeed, the strongest predictor of our willingness to support climate-friendly policies or consumption (e.g., buy an electric car) is the number of people we know who are already pro-environmental agents (Frank, 2021).

The real hope is that many people will be engaged in this kind of social influencing and thus create changes that get us to social tipping points. But how to get these social tipping points to happen? The best means is considered to be the spreading of behaviors, opinions, knowledge, or technologies, including structural changes or reorganization of social networks (Constantino et al., 2022; Priest, 2016). As governments have not proven either to set goals that are tough enough to make a difference in time, nor to live up to them when they are set (e.g., the COP series of meetings), success would seem to depend on bottom-up social action – that is, large-scale organisation or movements, propelled by changes in social norms, a topic we turn to in the next section.

Intermediate factors

The impact of personal decisions on climate-relevant variables can be mediated by different kinds of factors, which I will call 'intermediate'. I divide these factors into two categories: those related to a social dynamic around norms, and those related to the fact that actions might take place in the context of systems like social institutions.

Social norms

Our model suggests that influential action typically works through various influences on norms. What do we know about how to achieve rapid, large-scale norm change – which is the kind required to cause a social tipping point? Normative systems are actually complex: there is a positive feedback loop between seeing what other people are doing (so-called 'descriptive norms', because they describe what is actually happening), our beliefs about what others expect us to do ('subjective norms'), our expectation of social censure should we not do the 'right thing' ('injunctive norms'), and our own behaviour – which then serves as information to others about what *they* are expected to do. Behaviours and beliefs can thus be mutually reinforcing, making normative systems robust and resilient. This can also make them hard to shift to another equilibrium. The decision-making model provided earlier allows for such non-linear dynamics in norm change, due to the multiple input-output relations that could interact to produce non-linear changes in outcomes from social processes.

However, people are sensitive to information about any shifts in what others are doing over time (Constantino et al., 2022). So efforts to change norms can lead with information about descriptive norms – recent changes in what others are doing – or correct any misperceptions about what is popular or expected (which can arise from the spread of biased or misinformation). Basically, highlighting emerging trends rather than current practices can initiate norm change. In particular, significant misperceptions about the popularity of pro-environmental values and climate concern do exist (Sparkman, Geiger, & Weber, 2022). These misperceptions about the descriptive norm can be corrected by introducing information about what the actual situation is through an appealing message directed at the target population, leading to an increased subjective expectation of censure should one deviate from this newly recognized normative behaviour. This will in turn begin to shift subjective norms (beliefs about what others expect), and finally produce different behaviour from those with these changed expectations (Bicchieri, 2016). This is the way the feedback loops on norms between own and others' behaviour shown in our decision-making model work in practice. Changes in norms can also feed back into an individual's psychological traits, as well as into the systems I will discuss next. Obviously, behaviours that become strongly normative are more likely to be engaged in through a desire to conform with those norms, as a response to the increased perception of a need to be sensitive to social influence.

There can be significant problems, however, both in terms of knowing the prevalence of pro-environmental activity within one's own networks and of knowing about the practices of larger social groups that are relevant but of which one is not a member. This can leave one in a situation of considerable uncertainty about just where society sits with respect to the potential for change. The network perspective suggests that the 'weight' of one person's choices can vary, depending on the existing level of prevalence and the proximity of that prevalence to any tipping points. Finding ways to feed this

information back to individuals could be massively helpful for decision-making.⁵

When misperceptions or ignorance is not common and behaviour change is not happening at sufficient scale or with sufficient rapidity, it may be necessary to make a more concerted effort to achieve social norm change. Another route is to formulate an intervention to change the perceived social or environmental value of a target behaviour in some target group. This is a more activist proposition, with the intention of creating or seeding new norms. Quite a lot is known about how to do this (Constantino et al., 2022). The choice of target group or sub-culture is important, and there are various criteria or rationales for this choice. The other important choices are 1) what kind of value to use to persuade people, and 2) how to inculcate that value in the minds of those being targeted. Interventions, in effect, need to be *designed* to be effective. Essentially, trailblazers have to be motivated even when neighbours are continuing to live without sacrifice and given hero status, being acknowledged as first movers or adopters.

Systems

Finally, much of human action takes place in the context of membership or participation in a social institution, such as a workplace, financial institution, gym, or restaurant. Each of these contexts can have an influence on the eventual impact of a behaviour on climate. For example, restaurants often include vegetarian options nowadays.

Norms can influence such systems directly by modifying the expected practices within those systems or institutions. For instance, in many places, people are not allowed to smoke cigarettes, or during the recent pandemic, were required to wear masks indoors.

This model is able to accommodate the insight from another approach, which suggests that high-status people (who have a disproportionate influence on greenhouse gas emissions) potentially play five different roles with respect to the climate emergency: as *consumers* (e.g., dietary and transportation choices), *role models* (because people copy each other in social networks), *citizens* (when voting), *investors* (because your money distribution choices can influence the choices of institutions, including banks), and *organisational participants* (e.g., influence over work practices) (Nielsen, Nicholas, Creutzig, Dietz, & Stern, 2021). Efforts to influence this upper echelon of society might want to target the role(s) that have the biggest impact on their carbon footprints.

Conclusion

The point of this article has been to provide psychological tools to help people take action – whether personal, control- or influence-based – to have an impact on the climate crisis. The primary tool is a decision-making model that helps reduce any reluctance or paralysis individuals might feel about their situations. Should one be a relatively unknown and socially (as well as physically) isolated individual, the ability to influence others will be minimal, and the best

option will be to undertake as many personal actions as possible. However, I have deduced that actions which have no ramifications beyond the individual engaging in them will seldom have a major impact on global climate variables. It also might be that attending to convenient individual actions crowds out the time and motivation required for significant collective action.

Even some control actions are of limited impact: an individual vote, for example, both because it is one vote among many and because governments are often inactive. Getting consumers to ‘vote’ for eco-friendly products through their purchases leverages individual action to target rich companies using market mechanics. On the other hand, if an individual has significant control over the actions of a major private or public enterprise, and can put it into the service of the environment, that is obviously highly desirable, as the rich bear an incredibly outsized responsibility for global emissions.

What matters considerably, then, is often whether an individual has access to, and can influence, those in their social networks to act. This, in turn, is a function both of the number and social importance of individuals in that network, as well as the degree of influence our individual has over these others (that is, their position in the network). One can also seek to expand one’s network – engaging in noticeable actions can have this effect (e.g., Greta Thunberg). What the model shows is that anyone’s actions are a function of the beliefs and actions of others, so there is an intrinsic ‘spreading dynamic’ among those who look to each other for inspiration about what to do. So activism is always a choice. Serving as a role model can also mean that otherwise private actions become fodder for social influence (e.g., posting a video of oneself recycling can indirectly influence others, making it both a control and influence action simultaneously). It will rarely be the case that ‘going public’ is a bad idea, as it often costs little to do and increases the impact of that behaviour.

It will therefore almost always be the case that ‘emphasizing the social’ will be favoured by the decision-making calculus. The result could be the creation of clusters of Climate Champions, each egging on others in their own networks, with the spreading dynamic helping pro-environmental norms move to other networks, thus getting to scale, and achieving social tipping points.

Motivation remains key in most circumstances. Individuals need to behave differently than before, which means they must feel a new level of emotional need to be pro-environmental. Incentives have to come from somewhere. We have argued that the most likely source is changed social norms – that is, from the influence of what others are expecting. An increased sense of urgency can increase the value of action now and oppose the tendency to see consequences as abstract and temporally and demographically distant. It is this kind of dynamic that leads to social tipping points.

Further, as desperate as the current situation sounds with respect to climate, it is unfortunately not the end of the story. In fact, we are living through a ‘perfect storm,’ in which a

number of global-scale crises have built up strength together – not randomly, but because of their causal entanglement: increasing socio-economic inequality, biodiversity loss, frequent pandemics, the rise of authoritarian populism, financial instability, mass population movements, and climate heating (Homer-Dixon, Renn, Rockström, Donges, & Janzwood, 2022). For example, extreme weather patterns (fires and floods) caused by climate trends exacerbate economic disparities within and between societies because demographic groups have differential abilities to access or adapt to the impacts of weather on their livelihoods. These economic disparities intensify grievances within society and cause movements between them, strengthening populist nationalism and xenophobia. Election of isolationist governments in turn weakens the governance of global emissions, meaning the climate problem worsens (Homer-Dixon et al., 2022).

In effect, we are in the midst of a ‘global polycrisis’ (Morin & Kern, 1999) that requires tackling from many fronts simultaneously. The urgency of addressing this threat is increased by the likelihood that failure with respect to any one of these crises can lead to cascading impacts, where the likelihood of further failures increases once one particular risk has manifested (Lawrence, Janzwood, & Homer-Dixon, 2022). This makes it all the more urgent to reverse the existing feedback loops currently leading us toward disaster, by targeting tipping points that will get the interdependencies between these systems working in *favour* of the continued survival of our species, rather than *against* it. We can all be part of the ‘poly-solution’. Because these socio-political and environmental systems are interconnected, you can decide which system you want to engage with and leverage, presumably the one in which you have the best chance of influencing – the decision-making logic will hold regardless of the kind of impact being targeted (CO₂, biodiversity, or something else).

Footnotes

¹ Formally, that means points within a social system “at which a small quantitative change inevitably triggers a non-linear change in the social component of the [socio-ecological system] SES, driven by self-reinforcing positive feedback mechanisms, that inevitably and often irreversibly lead to a qualitatively different state of the social system” (Milkoreit et al., 2018).

² Much of the discussion in this paper will focus on climate processes related to carbonization of the atmosphere, but the same basic argument applies to other climate change metrics and processes, such as reduced biodiversity, or the accumulation of waste.

³ Please note I am not arguing that bottom-up social change is a substitute for climate legislation and broader structural changes. Promoting action by institutions is just outside the remit of this paper.

⁴ This is true *between* countries as well: the richer Western countries have contributed the vast majority of the emissions, especially when considered historically, but it is those countries which have not contributed significantly to the CO₂ levels that suffer the most from the consequences of the amount of carbon in the atmosphere (Evans, 2021).

⁵ Just be aware that publicizing a situation in which there is considerable distance to a majority or tipping point can be counter-productive by convincing people the norm is *not* to do anything, and that there is little possibility of achieving an environmental goal!

References

- Albrecht, G. (2011). Chronic environmental change: Emerging ‘psychoterratic’ syndromes. In I. Weissbecker (Ed.), *Climate change and human well-being: International and Cultural Psychology* (pp. 43–56). Springer, New York, NY: Springer.
- Armstrong McKay, D. I., Staal, A., Abrams, J. F., Winkelmann, R., Sakschewski, B., Loriani, S.,... Lenton, T. M. (2022). Exceeding 1.5 C global warming could trigger multiple climate tipping points. *Science*, 377(6611), eabn7950.
- Aunger, R (2023) ‘Decisions, decisions: Helping individuals find the best way to have an impact on the climate crisis’. In Thought Leadership for LiFE. NITI Aayog, New Delhi.
- Barrett, S., & Dannenberg, A. (2016). An experimental investigation into ‘pledge and review’ in climate negotiations. *Climatic Change*, 138(1), 339–351.
- Bicchieri, C. (2016). *Norms in the Wild: How to diagnose, measure, and change social norms*: Oxford University Press.
- Brown, C., Alexander, P., Holzhauer, S., & Rounsevell, M. D. A. (2017). Behavioral models of climate change adaptation and mitigation in land-based sectors. *Wiley Interdisciplinary Reviews: Climate Change*, 8(2), e448. Retrieved from <https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wcc.444>
- Carrus, G., Tiberio, L., Mastandrea, S., Chokrai, P., Fritsche, I., Klockner, C. A.,... Panno, A. (2021). Psychological Predictors of Energy Saving Behavior: A Meta-Analytic Approach. *Front Psychol*, 12, 648221. doi:10.3389/fpsyg.2021.648221
- Cialdini, R. B., & Jacobson, R. P. (2021). Influences of social norms on climate change-related behaviors. *Current Opinion in Behavioral Sciences*, 42, 1–8. doi:10.1016/j.cobeha.2021.01.005
- Clayton, S. (2020). Climate anxiety: Psychological responses to climate change. *J Anxiety Disord*, 74, 102263. doi:10.1016/j.janxdis.2020.102263
- Constantino, S. M., Sparkman, G., Kraft-Todd, G. T., Bicchieri, C., Centola, D., Shell-Duncan, B.,... Weber, E. U. (2022). Scaling up change: A critical review and practical guide to harnessing social norms for climate action. *Psychological science in the public interest*, 23(2), 50–97.
- Davidson, D. J., & Kecinski, M. (2022). Emotional pathways to climate change responses. *Wiley Interdisciplinary*

- Reviews: *Climate Change*, 13(2), e751. Retrieved from <https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wcc.751>
- Dillon, S., & Craig, C. (2022). Storylistening: How narrative evidence can improve public reasoning about climate change. *Wiley Interdisciplinary Reviews: Climate Change*, e812. Retrieved from <https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wcc.812>
 - Duff, H., Vignoles, V. L., Becker, M., & Milfont, T. L. (2022). Self-construals and environmental values in 55 cultures. *Journal of Environmental Psychology*, 79, 101722.
 - Evans, S. (2021). *Analysis: Which countries are historically responsible for climate change?* Retrieved from London <https://www.carbonbrief.org/analysis-which-countries-are-historically-responsible-for-climate-change/>
 - Fragnière, A. (2016). Climate change and individual duties. *Wiley Interdisciplinary Reviews: Climate Change*, 7(6), 798–814. Retrieved from <https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wcc.422>
 - Frank, R. H. (2021). *Under the Influence*. Princeton: Princeton University Press.
 - Frick, M., Neu, L., Liebhaver, N., Sperner-Unterweger, B., Stötter, J., Keller, L., & Hüfner, K. (2021). Why Do We Harm the Environment or Our Personal Health despite Better Knowledge? The Knowledge Action Gap in Healthy and Climate-Friendly Behavior. *Sustainability*, 13(23). doi:10.3390/su132313361
 - Gore, T. (2015). *Extreme carbon inequality: Why the Paris climate deal must put the poorest, lowest emitting and most vulnerable people first*. Retrieved from London: <https://oxfamlibrary.openrepository.com/handle/10546/582545>
 - Griffin, P. (2017). *The carbon majors database: CDP carbon majors report*. Retrieved from <https://cdn.cdp.net/cdp-production/cms/reports/documents/000/002/327/original/CarbonMajors-Report-2017.pdf>
 - Gutiérrez, M., & Gutiérrez, G. (2019). Climate Finance: Perspectives on Climate Finance from the Bottom Up. *Development*, 62(1), 136–146. doi:10.1057/s41301-019-00204-5
 - Hall, M. P., Lewis Jr, N. A., & Ellsworth, P. C. (2018). Believing in climate change, but not behaving sustainably: Evidence from a one-year longitudinal study. *Journal of Environmental Psychology*, 56, 55–62.
 - Homer-Dixon, T., Renn, O., Rockström, J., Donges, J., & Janzwood, S. (2022). *A call for an international research program on the risk of a global polycrisis*. Retrieved from Toronto: <https://cascadeinstitute.org/technical-paper/a-call-for-an-international-research-program-on-the-risk-of-a-global-polycrisis/>
 - Hormio, S. (2023). Collective responsibility for climate change. *Wiley Interdisciplinary Reviews: Climate Change*, e830. Retrieved from <https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wcc.830>
 - IEA. (2021). *Net Zero by 2050*. Retrieved from Paris: <https://www.iea.org/reports/net-zero-by-2050>
 - IEA. (2022). *World Energy Employment*. Retrieved from Paris: <https://www.iea.org/reports/world-energy-employment>
 - Islam, N., & Winkel, J. (2017). *Climate change and social inequality*. Retrieved from New York:
 - Ivanova, D., Barrett, J., Wiedenhofer, D., Macura, B., Callaghan, M., & Creutzig, F. (2020). Quantifying the potential for climate change mitigation of consumption options. *Environmental Research Letters*, 15(9). doi:10.1088/1748-9326/ab8589
 - Juhola, S., Filatova, T., Hochrainer-Stigler, S., Mechler, R., Scheffran, J., & Schweizer, P.-J. (2022). Social tipping points and adaptation limits in the context of systemic risk: Concepts, models and governance. *Frontiers in Climate*, 4. doi:10.3389/fclim.2022.1009234
 - Keller, E., Marsh, J. E., Richardson, B. H., & Ball, L. J. (2022). A systematic review of the psychological distance of climate change: Towards the development of an evidence-based construct. *Journal of Environmental Psychology*, 81. doi:10.1016/j.jenvp.2022.101822
 - Lawrence, M., Janzwood, S., & Homer-Dixon, T. (2022). *What Is a Global Polycrisis?* Retrieved from Toronto: <https://cascadeinstitute.org/technical-paper/what-is-a-global-polycrisis/>
 - Milkoreit, M., Hodbod, J., Baggio, J., Benessaiah, K., Calderón-Contreras, R., Donges, J. F.,... Werners, S. E. (2018). Defining tipping points for social-ecological systems scholarship—an interdisciplinary literature review. *Environmental Research Letters*, 13(3). doi:10.1088/1748-9326/aaaa75
 - Morin, E., & Kern, A. B. (1999). *Homeland Earth: A manifesto for the new millennium*: Hampton Press (NJ).
 - Nolan, J. M. (2021). Social norm interventions as a tool for pro-climate change. *Curr Opin Psychol*, 42, 120–125. doi:10.1016/j.copsyc.2021.06.001
 - Organization, World Meteorological. (2022). *United in Science 2022*. Retrieved from <https://public.wmo.int/en/resources/united-in-science>
 - Oswald, Y., Owen, A., & Steinberger, J. K. (2020). Large inequality in international and intranational energy footprints between income groups and across consumption categories. *Nature Energy*, 5(3), 231–239. doi:10.1038/s41560-020-0579-8
 - Otto, I. M., Donges, J. F., Cremades, R., Bhowmik, A., Hewitt, R. J., Lucht, W.,... Schellnhuber, H. J. (2020). Social tipping dynamics for stabilizing Earth's climate by 2050. *Proc Natl Acad Sci U S A*, 117(5), 2354–2365. doi:10.1073/pnas.1900577117
 - Oxfam. (2021). *Confronting carbon inequality: Putting climate justice at the heart of the COVID-19 recovery* Retrieved from Oxford:
 - Priest, S. (2016). *Communicating climate change: The path forward*: Springer.
 - Programme, U. N. E. (2022). *Emissions Gap Report 2022: The Closing Window — Climate crisis calls for rapid transformation of societies*. Nairobi. Retrieved from <https://www.unep.org/emissions-gap-report-2022>
 - Sparkman, G., Geiger, N., & Weber, E. U. (2022). Americans experience a false social reality by underestimating popular climate policy support by nearly half. *Nature communications*, 13(1), 1–9.
 - Toivonen, H. (2022). Themes of climate change agency: a qualitative study on how people construct agency in

relation to climate change. *Humanities and Social Sciences Communications*, 9(1). doi:10.1057/s41599-022-01111-w

- Waring, B., Neumann, M., Prentice, I. C., Adams, M., Smith, P., & Siegert, M. (2020). *What role can forests play in tackling climate change?* Retrieved from London:
- Weber, E. U. (2006). Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet). *Climatic change*, 77(1), 103-120.
- Whitmarsh, L., Player, L., Jiongco, A., James, M., Williams, M., Marks, E., & Kennedy-Williams, P. (2022). Climate anxiety: What predicts it and how is it related to climate action? *Journal of Environmental Psychology*, 83. doi:10.1016/j.jenvp.2022.101866
- Wiedmann, T., Lenzen, M., Keyßer, L. T., & Steinberger, J. K. (2020). Scientists' warning on affluence. *Nature Communications*, 11(1), 3107. doi:10.1038/s41467-020-16941-y
- Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: education and government recommendations miss the most effective individual actions. *Environ. Res. Lett.*, 12(074024).
- Wyss, A. M., Knoch, D., & Berger, S. (2022). When and how pro-environmental attitudes turn into behavior: The role of costs, benefits, and self-control. *Journal of Environmental Psychology*, 79. doi:10.1016/j.jenvp.2021.101748
- Xiang, P., Zhang, H., Geng, L., Zhou, K., & Wu, Y. (2019). Individualist–Collectivist Differences in Climate Change Inaction: The Role of Perceived Intractability. *Frontiers in Psychology*, 10. doi:10.3389/fpsyg.2019.00187

Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.