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Lessons Learned from COVID-19: Insights for Climate Change Mitigation

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Background

COVID-19 has had a dramatic impact on our daily lives, forcing us to change our behaviour in the best interest of public health. The global response to COVID-19 has been unified and public health measures imposed by all levels of governments have been effective at slowing the spread of the virus. Governments and the public have trusted expert opinion throughout the pandemic to inform their actions and guide recovery strategies. The COVID-19 pandemic has shown us just how effective collective action can be at tackling a crisis, especially in Canada where public health measures have been incredibly successful. Lessons can be learned from our handling of the COVID-19 crisis which can be applied to climate change.

Lesson #1

Collective action can be an incredibly effective force for addressing a crisis and is integral to achieving positive outcomes. Climate change is a global problem that demands a global solution and meaningful collective action that is guided by science (i.e. expert opinion) would be effective at mitigating global climate change. Although the spread of coronavirus differs from climate change in that at a national level countries that manage to effectively address coronavirus benefit greatly from their own policies by reducing the spread and countries that do manage to take effective action on climate change would still be affected by those that don't (Keohane & Victor, 2016), collective action will achieve a positive outcome in either case. The effectiveness of collective action is demonstrated by the success of governments in addressing coronavirus using this approach. Conversely, inaction by other governments has illuminated the simple fact that some governments will take effective action during time of crisis and in the best global interest and others will choose not to.

The economic costs of addressing these issues can be a significant barrier taking meaningful collective action but opting not to take collective action in the interest of unconstrained economic growth ultimately has its

own economic costs. The inability of the U.S. to take collective action on coronavirus has had its own economic costs such as interrupting trade with other countries or prolonging the pandemic and forcing the economy to stay closed that is analogous to the economic discourse on climate change. For example, choosing not to mitigate climate change in favour of unbounded economic growth will undoubtedly result in significant negative economic effects (Barrage, 2020). Climate change will ultimately necessitate the transition to a low-carbon economy but until we can achieve this we need to pursue mitigation measures at the expense of some economic growth to avoid the future economic cost of dealing with the worst effects of unmitigated climate change. We need to act collectively both to mitigate climate change (at the expense of some economic growth in the meantime) and also act collectively to transition to a low-carbon future (which will also have upfront costs) to reconcile economic barriers to collective action and continue to maintain economic growth and a stabilize the climate in the long term. Collective action is particularly important in the context of climate change and a co-ordinated global response founded on shared goals and values is needed since all countries will benefit from measures to mitigate climate change whether they choose to take action or not (Keohane & Victor, 2016).

Lesson #2

Expert opinion matters. Expert opinion was the basis of policies and public health measures that were effective at slowing the spread of coronavirus but despite almost complete consensus by climate scientists that climate change is human caused, expert opinion on climate change is still routinely disputed (Strudwicke & Grant, 2020). Many experts on coronavirus have become recognizable and trusted figures in the media and they are qualified and trusted not only because of their credentials but also because their recommendations have had a measurable positive impact. Conversely, demonstrating the effectiveness of climate change mitigation will be difficult since the effects will be felt over a much longer time period, but the positive effects of mitigation strategies that we take now will undoubtedly be evident over the long term and the magnitude of the negative effects of climate change will depend on our future emissions trajectory (Government of Canada, 2019). Expert opinion is undermined by disinformation and misinformation and although climate change disinformation is more pervasive and well-established, coronavirus disinformation and misinformation is also quite common. Disinformation and misinformation related to climate change which is intended to raise doubt has resulted in confusion and uncertainty among the public on the issue of climate change is already well established in society and difficult to correct and we will have to confront these issues to continue implement policies based on expert opinion (Lewandowsky et al., 2013; Oreskes & Conway, 2010).

The effective communication of scientific issues such as climate change and the correction of false information is critically important for the public to trust expert opinion. Scientific communication of climate change especially has been plagued by a lack of understanding of terms like uncertainty which has a different meaning in a scientific context than it does colloquially (Hillerbrand, 2009; Avi-Yonah & Uhlmann, 2009; Bocking, 2004). Scientific uncertainty refers to the range of values in which the true value lies (e.g. how much the earth's mean temperature will increase over the next 50 years). It does not mean that scientists are uncertain whether a phenomenon such as climate change is actually occurring or not but this is often how it is

misconstrued (Hillerbrand, 2009; Avi-Yonah & Uhlmann, 2009; Bocking, 2004). Decision makers are often not trained in science and therefore have limited understanding on how much emphasis to place on scientific findings (Bocking, 2004). During the coronavirus pandemic, experts were trusted to contribute to policies in ways that is normally within the realm of decision-makers. The degree to which policymakers trusted experts during the COVID-19 pandemic has been varied but ultimately determinate of the effectiveness of government responses to the pandemic. Evidently, we need to learn that the effectiveness of a response to a crisis is positively correlated with the degree to which decision-makers rely on experts and the effectiveness of policies informed by expert opinion during the COVID-19 pandemic is proof of the success of policies based on expert opinion. Science forms the basis of our understanding of both climate change and coronavirus and the path forward as we take action to deal with these issues. However, a lack of trust in science is a barrier to meaningfully addressing these issues in democratic societies and this standing needs to improve to fully implement scientifically based decision-making that would be beneficial for tackling both of these issues.

Lesson #3

Uncertainty does not justify inaction. Scientific uncertainty has long been misrepresented in the context of climate change by certain fossil fuel producers to sow confusion among the public in order to delay action on climate and correcting these incorrect deep-seated beliefs arising from co-ordinated corporate disinformation campaigns is a priority in terms of furthering the discourse on climate change (Bocking, 2004; Lewandowsky et al., 2013; Oreskes & Conway, 2010). Disinformation and misinformation can create confusion among the public which undermines taking meaningful collective action. This has also been observed in the COVID-19 pandemic by the reluctance of some individuals to adopt public health measures like wearing masks and social distancing and also the adoption of conspiracy theories related to the virus. The acceptance and trust of science is at the root of some of these issues and certain individuals and groups are predisposed to worldviews which question the validity of science.

Scientific uncertainty is a normal part of scientific inquiry and arises from an incomplete understanding of what is being studied which is often complex phenomenon. Due to the reproducibility of results that is an inherent part of the scientific process, there is often little or no discord among experts in their fields (especially things that have been well established scientifically by being confirmed through numerous retrials achieving the same result) and when there is, it is often a result of mistakes or arises in a much subtler interpretation of whatever is being studied (i.e. there is an array of accepted climate models which show a range of different warming scenarios but all agree that the climate science unequivocal that the earth is warming in some capacity) (Flato et al., 2013). During the COVID-19 pandemic, experts agreed early on that the disease was deadly, highly contagious, and that measures to curb the spread of the disease until a vaccine is developed was the only way to limit morbidity and mortality from the virus. Since the virus was novel, there was some uncertainty regarding the specific characteristics of the virus such as if individuals can become reinfected and exactly how many deaths it could be expected to cause but still enough was known about the virus based on the body of scientific knowledge to take effective preventative actions. Climate change is similar in that there is more than enough scientific evidence to take meaningful and preventative action, even

though the future negative effects of climate change are not fully understood. In climate science, uncertainty is partly due to the difficulties in modelling very complex systems and as we learn more, we can reduce this uncertainty, but it will never be totally eliminated (Hillerbrand, 2009). Therefore, it cannot continue to be an obstacle to taking action on climate change.

Lesson #4

COVID-19 has amplified economic inequalities between Canadians and climate change is also expected to exacerbate existing economic inequalities (domestically and globally). Bonnacorsi et al., (2020) found that fiscal inequalities and poverty increased during the COVID-19 lockdown measures in Italy and recommended that governments take measures to mitigate these outcomes and sustain vulnerable individuals. Research conducted in other developed nations also points to similar trends. Patel et al., (2020) found that individuals of low socio-economic status were the most vulnerable individuals in the U.K. to COVID-19. In the U.S., communities with lower socio-economic status were found to be more vulnerable to COVID-19 than other groups and those in poverty and with disabilities had higher deaths rates (Abedi et al., 2020). Even within Canada, which has a sophisticated welfare state and a mandate to promote policies that are equitable across groups of diverse individuals (e.g. GBA+), socio-economic inequalities have been magnified between Canadians during the pandemic with individuals of low socio-economic status more vulnerable to the disease (Wherry, 2020; Bryant, Aquanno & Raphael, 2020). Additionally, these inequalities reflect established patterns of systemic inequalities in Canada and while the government's COVID-19 response reflects the urgent needs of crisis management, it does little to address long standing inequalities in Canadian society (Bryant, Aquanno & Raphael, 2020).

Taking drastic action to fight the pandemic such as the imposition of lockdown measures has ultimately proven to affect diverse groups differently and while acknowledging the difficulties of imposing policies that are amenable to GBA+ during a crisis, these policies also reveal the inherent difficulties in addressing inequalities during times of crisis. A similar situation will inevitably occur if climate change results in a crisis of a similar proportions (some proponents have already suggested that climate change is already a crisis). Therefore, we must actively work to reduce inequalities in our societies and globally to mitigate the negative implications of these inequalities during times of crisis. Furthermore, there are lessons to be learned from the COVID-19 pandemic; proactive measures to design more equitable policies in anticipation of crises, especially in the context of the ongoing and impending negative effects of climate change would reduce the burden of these crises on disadvantaged individuals. This is especially important in the context of climate change because of the associated long-term negative effects. Maintaining the status quo of inequality is not only undesirable but may also prove difficult as the climate change progresses and places further stress on our societies. For example, in the Canadian North, climate change is occurring at an accelerated rate and the region already exhibits low levels of socio-economic development compared to the rest of Canada. Without policies aimed at proactively addressing these inequalities, certain individuals and groups will continue to be disproportionately affected during times of crisis.

Global inequalities have been exacerbated by climate change (Diffenbaugh & Burke, 2019) and the greatest negative impacts of warming in excess of 1.5°C above pre-industrial levels will be felt by the world's poorest (King & Harrington, 2018). Research on climate change inequalities is well established in the literature and measures to combat poverty and adapt to climate change will have positive impacts globally and domestically (King & Harrington, 2018; Islam & Winkel, 2017) but COVID-19 has made these issues more apparent. Many developing countries are suffering the worst outbreaks and are unfortunately acutely aware of the lack of resources to deal with this crisis. In comparison, developed countries are faring much better because they have the resources to deal with the crisis (broadly speaking). A similar pattern is likely to emerge as climate change progresses with developed nations having the resources to deal with the challenges of climate change in stride while developing countries struggle to adequately address the adverse effects of climate change with limited resources and limiting their capacity for future growth in the process. Furthermore, future unexpected crises such as the COVID-19 pandemic will be exacerbated by the negative effects of climate change (and attempts to deal with them) meaning we should redouble our efforts to proactively reduce social inequalities at home and abroad before these eventualities occur.

The rapid economic development of India and China has decreased inequalities between developed and developing nations over the past few decades but climate change threatens to reverse this trend since impacts will affect poor countries disproportionately due to economic damages resulting from the negative effects of climate change (like extreme weather) and the disproportionate cost of reducing emissions (i.e. on developing countries which rely on fossil fuels to drive economic growth and increase domestic well-being) (Bassetti, 2020). Achieving collective action on climate change will be a challenge but mitigating climate change globally could provide an opportunity to address global inequalities (Bassetti, 2020). Addressing global inequalities could ultimately contribute to a more peaceful world. In contrast, inequalities exacerbated by climate change will be a destabilizing force and likely lead to increased worldwide conflict (e.g. over limited resources) and humanitarian crises and is increasingly framed as a security problem (Barnett & Adger, 2007).

Lesson #5

The problems of COVID-19 and climate change will not solve themselves. Climate change will not simply go away even if we stopped emitting GHGs tomorrow and there is some indication now that even if we do successfully mitigate climate change that we will also have to combine this with a geoengineering solution in order to avoid the worst effects of climate change or worse, crossing critical planetary thresholds that keep the earth in stable and habitable state (Steffen et al., 2018; Pearce, 2019). A vaccine is the only safe way that we can deal with COVID-19 and transitioning to a low carbon economy is the only way to solve climate change. Both of these solutions will require careful and active management to mitigate the risks that they pose to society in the meantime. There is no evidence to support the rhetoric employed by figures such as Donald Trump that suggest that the uncontained spread of the virus is a way to gain herd immunity or similarly that we can take a business as usual approach to emitting GHGs and expect not to suffer the adverse consequences of climate change. Until we have the means to fully deal with these issues, active management that is based in science will be required to address these problems. In the context of climate change, active

management over the long term is needed in the form of adaptation and mitigation to limit the negative impacts of climate change and keep the climate in a stable state (Steffen et al., 2018). The climate change equivalent to a COVID-19 vaccine will be a combination of technologies (e.g. geoengineering solutions, renewable or carbon-free energy etc.) that allow our societies to reach net zero carbon emissions. Efforts to mitigate climate change are sometimes viewed as a burden or being a source of hardship and if action on climate change is further delayed, it may be necessary to drastically curb GHG emissions at the expense of economic growth to avoid high magnitude negative effects of climate change but given the current state of technology, there are opportunities to begin to seriously mitigate GHG emissions (e.g. through the implementation of cleaner fuels, renewable technologies, and carbon offsets) and we need to continue to develop these technologies to stabilize the concentration of GHGs in our atmosphere. If the vaccine equivalent for climate change is a combination of technologies that help us to reach net zero emissions, then the response should be proportional to the current state of crisis. The rapid development of a COVID-19 vaccine is proof that rapid technological progress that can be made in a short time and this effort is sometimes likened to wartime conditions when resources are mobilized rapidly to accelerate the rate of technological development. Similarly, investments need to continue to drive innovation and development of technologies to help us reach net zero emissions. It may be necessary to declare war on climate change in the same way that we declared war on COVID-19.

The term Anthropocene has been used by scientists and in other academic fields to describe the totality of the impacts that humanity has had on the global environment (including but not limited to climate change, biodiversity loss, land-use changes, and the interaction between these impacts) and suggests that we have entered a new geological era which is dominated by human activity (Steffen et al., 2018). The implications of the Anthropocene for humanity are significant. Humanity will have to manage its activity closely to maintain the earth's systems which sustain the global environment in a relatively stable state that human life can continue to thrive in. In essence, humans are now responsible for their own fate. These implications (of the Anthropocene and global environmental change) also point to the need to examine security and societal change within the context of global environmental changes and to address the root causes of environmental changes in the Anthropocene (such as mitigating climate change) as a means of reducing the risk of conflict (Hardt, 2012).

Lesson #6

Issues such as coronavirus and climate change can be polarizing and politicized issues. The importance of science and expert opinion cannot be understated yet many people don't share this belief or rely on alternative sources of information containing disinformation and misinformation. Reliable sources of information are an important commodity in democratic societies and there have been issues recently with the uptake of misleading or false information from non-conventional sources such as the internet and social media. This has been evident during the coronavirus pandemic through the emergence of certain groups such as the anti-maskers and COVID-19 hoax conspiracy theorists that hold beliefs that oppose our scientific understanding of the virus. Vaccines and climate change are considered some of the most polarizing issues in

Western societies and how these issues are perceived is often (though not always) associated with a particular political stripe (not necessarily the same political stripe) (Strudwicke & Grant, 2020).

Broadly speaking, it would be inappropriate to suggest that trust in science is associated with a particular political stripe since scientific issues (i.e. vaccines versus climate change) are interpreted differently across the political spectrum (Strudwicke & Grant, 2020). However, depending on the stance of a political party or leader on a particular issue these can become partisan issues regardless of what the science tells us. For example, Donald Trump in the U.S. has continually misrepresented science relating to the coronavirus and climate change. Other politicians have also misrepresented science in the past. The pervasiveness of beliefs and worldviews that conflict with our scientific understanding of these issues needs to be addressed. Science itself cannot continue to be a polarizing a politicalized issue. The outright rejection of science that conflicts with individuals' worldviews is an impediment to crucial science-based decision-making in democratic societies. Science is not a matter of politics and there should be wider public trust in science as an impartial but important source of information to look upon policies with objectivity.

Lesson #7

Stable international relations are important for coordinating global responses to issues like coronavirus and climate change. Whether the global handling of coronavirus will strengthen the international order and its ability to tackle future global crises such as climate change remains to be seen. Supranational organizations such as the WHO are working hard to secure vaccines and combat the disease globally, including for developing and undeveloped nations (WHO, 2020). However, the current U.S. presidency has expressed its intent to withdraw the U.S. from the WHO and this is seen as move that would weaken the international order and threaten global health and security (Gostin et al., 2020). Similarly, the recent withdrawal of the U.S. from the Paris Agreement is a move that will hamper efforts to coordinate a global response to climate change (McGrath, 2020). The effectiveness of the global response to crises such as the COVID-19 pandemic and climate change depends to a large degree on the work of supranational organizations like the WHO and multilateral agreements to coordinate a global response. And, while the COVID-19 pandemic has revealed limitations in the WHO's funding and powers and the need for substantial reforms (Gostin et al., 2020), there is a need to strengthen these organizations and multilateralism rather than weaken them in the interest of strengthening the international order. The limitations in the WHO's functioning revealed by the pandemic should prompt governments to strengthen international co-operation on climate change and to foster global innovation and solutions to a complex global problem. Additionally, the success of a global COVID-19 response should be testament to important role that supranational organizations and multilateral agreements play in the international order by coordinating global responses to challenges and crises. A strong global response to climate change could be a source of stability in international relations or conversely a weak response could be a source of contention. Ultimately, what the future international order looks like could either facilitate or hinder a global response to climate change.

The stability of the international order continues to be threatened by great power competition and the shift of economic power (from west to east) could have drastic consequences for mitigating climate change. The rise

of the United States as a hegemon relied heavily on the use of fossil fuels for economic growth and now the economies of other emerging economic powers like China and India are also heavily reliant on burning fossil fuels. The current and future distribution of wealth and global inequalities will leave the world's poorest most vulnerable to the negative impacts of climate change. Unfortunately, these populations will not have the ability to generate wealth cheaply through the burning of fossil fuels as wealthier countries have done in the past because this would certainly result in catastrophic climate change. Therefore, wealthier countries have a role to play in ensuring the welfare of the world's poor in the context of climate change. Co-ordinated efforts among hegemonies to care for the world's poorest could also be a source of stability in international relations.

Lesson #8

An ounce of prevention is worth a pound of cure. The goal of public health measures during the COVID-19 pandemic was to flatten the curve and prevent cases from spiking all at once and overwhelming the healthcare system. This proved to be effective in countries that implemented appropriate health care measures and ensured that they had sufficient resources to handle cases. Conversely, in countries that were unable to control the spread of the virus, healthcare capacity was overwhelmed, and necessary resources were strained. Similarly, if we continue to take a business as usual approach to emitting GHGs we are more likely to be overwhelmed by the negative effects of climate change, straining or possibly exceeding our capacity to deal with them effectively. A more logical way to deal with these negative effects would be to take efforts to mitigate GHG emissions and slow warming thereby delaying and reducing the magnitude of negative effects. The world's poor which don't have adequate resources to adapt to the negative effects of climate change also benefit from a preventative approach to climate change since a more manageable crisis in developed nations will free up time and resources that can be used to lessen the impacts of climate change on the world's most vulnerable.

The reason why climate scientists continue to push for significant GHG mitigations measures is because of the negative effects and possibly dangerous outcomes that we will experience if we continue to burn fossil fuels at current rates (Steffen et al., 2018). Geoengineering measures to stabilize the climate are still seen as possibly dangerous and currently don't have the capacity to ameliorate climate change but may ultimately be necessary, in combination with mitigation measures to keep our climate in a stable and habitable state (Steffen et al., 2018). However, maintaining our climate in a stable and habitable state, which we now must do through active management, will be facilitated by efforts to prevent further climate change (i.e. through mitigation) and hindered by unabated fossil fuel burning. Furthermore, some impacts of climate change on the global environment will be irreversible such as the loss of the polar ice caps and glaciers, coral reefs, species, and ecosystems and will be permanent even if we do manage to stabilize the climate through mitigation or geoengineering. Aside from the risk of doing irreversible damage to the earth's natural systems which support life, there are other practical reasons to try to stabilize the climate in the interest of self preservation such as making dealing with the negative effects of climate change more manageable.

Conclusion

Comparing the issues of climate change and COVID-19 is a useful exercise since both have similar characteristics as global and scientifically understood issues yet are occurring on different time scales which allows the lessons from one to be applied to the other. Climate change is a complex issue that has proven difficult to address despite clear scientific evidence that burning fossil fuels is the cause. Since the greatest negative impacts of climate change will be felt by future generations it can be difficult to conceptualize this issue in the same way as an imminent crisis like coronavirus. Nevertheless, the actions that we take now are highly significant in the context of climate change and applying lessons from COVID-19 change can further current actions to coordinate a global response and help us overcome some of the challenges associated with taking action on climate change.

In summary:

1. Collective action is of course needed to take meaningful action on climate change and the effectiveness of such an approach is demonstrated by the effectiveness of actions taken by the collective to reduce the spread of COVID-19.
2. Expert opinion and particularly science in the case of coronavirus and climate change is also critically important for informing successful policies and the effectiveness of these policies can be gauged by the degree to which they rely on expert opinion and science.
3. Uncertainty is an inherent part of scientific inquiry but poorly understood and cannot continue to be a barrier to action on climate change. Action on coronavirus despite uncertainty is proof that preventative policies can indeed be effective even in the face of considerable scientific uncertainty.
4. Policies need to explore ways to address inequalities domestically and globally which are exacerbated during times of crisis. Taking action to reduce inequalities proactively to reduce the impact of climate change on the world's poorest would also be beneficial and this could be a source of stability in international relations.
5. Decisive action is needed to solve the problem of climate change because it will not simply go away. This will be in the form of a combination of technologies like low carbon or carbon free sources of energy, geoengineering solutions and carbon offsets which allows us to decouple GHG emissions with economic growth to transition to a low carbon economy in the future. Decisive action on coronavirus curbed the spread of the virus and initiated the development of a vaccine which will be crucial for ending the pandemic.
6. Coronavirus and climate change can be polarizing and politicized issues, but we need to move past this and achieve a greater acceptance of science as an objective and impartial source of information to guide our actions. Science supports the use of vaccines as a way to gain herd immunity and stop the pandemic but a propensity to distrust science means that some individuals will opt not to take the vaccine, threatening our herd immunity. Similarly, the refusal to accept climate science will continue to be a barrier to adapting to and mitigating climate change and threaten a global and unified response.

Partisanship on these issues in democratic societies could be particularly problematic and result in inaction.

7. Stable international relations are important for coordinating global responses to issues like coronavirus and climate change. A unified global response to climate change could be a source of stability in international relations. Conversely, a weak response could be a source of contention as some countries seek to benefit at the expense of others.
8. An ounce of prevention is worth a pound of cure. Climate change will cause many irreversible impacts to earth's natural systems and unmitigated climate change may result in sudden, disruptive changes as we reach global tipping points which will strain our capacity to adapt. Just as public health measures slowed the spread of coronavirus and made the crisis more manageable, mitigating climate change can slow global environmental changes or prevent them altogether and facilitate our ability to adapt.

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