



Environmental Policy Lessons from Roman Agrarian Philosophy

Citation

Roy, Devjani. "Environmental Policy Lessons from Roman Agrarian Philosophy." M-RCBG Associate Working Paper Series 2022.180, Harvard University, Cambridge, MA, April 2022.

Permanent link

<https://nrs.harvard.edu/URN-3:HUL.INSTREPOS:37371317>

Terms of Use

This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Open Access Policy Articles, as set forth at <http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#OAP>

Share Your Story

The Harvard community has made this article openly available.
Please share how this access benefits you. [Submit a story](#).

[Accessibility](#)



HARVARD Kennedy School

MOSSAVAR-RAHMANI CENTER
for Business and Government

Environmental Policy Lessons from Roman Agrarian Philosophy

Devjani Roy
Harvard Kennedy School

April 2022

M-RCBG Associate Working Paper Series | No. 180

The views expressed in the M-RCBG Associate Working Paper Series are those of the author(s) and do not necessarily reflect those of the Mossavar-Rahmani Center for Business & Government or of Harvard University. The papers in this series have not undergone formal review and approval; they are presented to elicit feedback and to encourage debate on important public policy challenges. Copyright belongs to the author(s). Papers may be downloaded for personal use only.

Title: “Environmental Policy Lessons from Roman Agrarian Philosophy”

Author: Devjani Roy

Affiliation: Mossavar-Rahmani Center for Business and Government, Harvard Kennedy School

Abstract: This essay examines Roman agrarian philosophy and poetry, with a focus on the works of Cato, Varro, and Virgil, to argue that these texts are prescient in their vision of the sustainable city: one in which economic growth is balanced with the environmental needs of urban ecosystems, while also maintaining resource efficiency that minimizes the impact on the global climate system. I also draw lessons from the coronavirus pandemic, arguing that the pandemic conclusively demonstrates how diseases are connected to interdependent urban and peri-urban ecosystems shared by both humans and animals, and making the case for improvements in the global public health infrastructure. Finally, I argue that creating the sustainable city requires changing the collective cultural mindset: that the goal of reducing the adverse per-capita environmental impact of cities is imperative for enlightened urban planning. Ultimately, the essay considers policy lessons that can be drawn from Roman agrarian philosophical texts: that the sustainable city is an environmentally resilient habitat that also ensures future generations can enjoy the same.

Environmental Policy Lessons from Roman Agrarian Philosophy

On November 4, 2019, the United States formally left the Paris Agreement, the first and only nation among the seventy-five signatories to do so, five years after the Paris Climate Agreement was signed in 2015. While the U.S. rejoined the Paris Agreement on February 19, 2021 after President Biden took office, membership in the Paris Agreement is a recognition of stark scientific reality: Our planet has warmed by 1 degree Celsius (or 1.8 degrees Fahrenheit) since the start of the Industrial Revolution in the late 1800s (NASA Earth Observatory, n.d.).

Two important developments took place in the field of environmental policy in late 2018 and early 2019. In November 2018, the landmark Fourth National Climate Assessment was released, projecting that if fossil fuel emissions were allowed to continue

at their current rate unchecked, the earth's atmosphere would get warmer by eight degrees Fahrenheit by 2090, leading to rising sea levels and widespread crop failures. Then in January 2019, 3,589 economists signed "the largest public statement of economists in history" arguing that "[g]lobal climate change is a serious problem calling for immediate national action" ("Economists' Statement on Carbon Dividends" 2019).

These are not isolated alarmist pieces on the inevitability of an uninhabitable earth. In 2019 and early 2020 alone, wildfires burned over 12.35 million acres in Australia, wildfires in Brazil's Amazonian rainforests released billions of tons of carbon into the atmosphere, and climatologists warned Greenland's ice sheet and the Arctic permafrost are melting at a pace both accelerated and irreversible. We are at a tipping point in terms of a shared destiny.

I argue that to protect the future of the planet we must look to the past. In so doing, I draw upon Roman agrarian philosophy, a genre of writing more than 2,000 years old that makes a compelling argument for protecting delicate environmental ecosystems. Originally intended to be didactic in nature, agrarian philosophy has a long tradition in both Classical Greece—most notably, the works of Xenophon, Aristotle, and Hesiod—and Classical Rome. In this essay I focus on Roman writers, more specifically, Cato's *De Agri Cultura* ("On Agriculture") written around 160 B.C., Varro's *Res Rusticae* (also "On Agriculture") written around 37 B.C., and Virgil's *Georgics*, written around 29 B.C. Taken together, these texts cover the historical periods known as the late Roman Republic and the early Augustan Age. Taking an interdisciplinary and intertextual approach that draws from philosophical perspectives as well as contemporary

environmental action policy, I argue that changing policy to accommodate climate-change reality is a political, social, and moral imperative that has historical precedent.

1. Roman Agrarian Philosophy

Classical Rome's Republican and Augustan periods collectively span roughly 509 BCE to 14 CE. The Roman Republic held sway during the period 509 BCE to 27 BCE, and was an ancient state governed administratively from the city of Rome. During this period, elected magistrates replaced Roman monarchy—a form of government that continued until 27 BCE when the Roman Empire was established. The Augustan Age is named for Rome's first emperor Augustus Caesar, also Julius Caesar's nephew, who ruled the Roman Empire from 27 BCE to 14 CE, a period known for its political stability, peace, and flowering of the cultural arts after years of civil war. During the Augustan Age, Augustus combined elements of republican government with those of a monarchy. Classical Greece covers a 200-year period, the fourth and fifth centuries BCE.

Multiple agrarian philosophical tracts exist from the Classical periods in both Greece and Rome—Columella's *De re Rustica* ("On Rural Affairs") and Xenophon's *Oeconomicus*, for instance—but in this essay, I focus on texts from Classical Rome, more specifically the late Roman Republic (509 BC–27 BC) and the early years of the Roman Empire (27 BC–476 AD): those by Cato (*De Agri Cultura*), Varro (*Res Rusticae*), and Virgil (*Georgics*). All three texts are unified by common threads. First, as agrarian advice manuals, they are comprehensive and substantial in scope—they offer timeless instructions on farming the land, herding and raising of both cattle and horses, viticulture,

bee-keeping, and the financial aspects of farming. This last item is significant: these writers do not ignore the concept of profit; on the contrary, they posit that natural resources cannot be used for exploitation and temporary gain precisely because doing so will deplete these limited resources. Second, they recognize the importance of climatology, or climate science, such as it existed in a pre-Industrial Age. Finally, and perhaps most critically, each author recognizes we are stewards of the earth, charged with the task of conserving and passing on to the next generation, instead of thoughtlessly exploiting in the present.

Varro's *Res Rusticae* ("On Agriculture") consists of three books—on farming, animal husbandry, and farm-steading practices that he wrote as an advice manual for his wife, Fundania, to be followed after his death (indeed, he was past eighty when he wrote *Res Rusticae*) (1935). He writes, "Therefore I shall write for you three handbooks to which you may turn whenever you wish to know, in a given case, how you ought to proceed in farming" (161). Cato's *De Agri Cultura* ("On Agriculture") is a loosely connected farmer's handbook of instructions on all manner of farm-related activities: olive growing, keeping vineyards, grain cultivation, growing vegetables, and rearing cattle. Virgil's *Georgics*, the last in terms of time of composition, is made up for four separate books: each on farming, animal husbandry, beekeeping, and viticulture. Each author makes the case for specialization of labor, recommends allowing the land time to regenerate itself, and suggests that being profitable in each enterprise should be the ultimate goal. In other words, sustainable environmental practices need not ignore the profit motive; or, as Varro (1935) reminds his wife Fundania, "since you have bought an estate and wish to make it profitable by good cultivation" (161). While rarely read these

days outside of Classics degree programs, I find all three authors make a point that environmental policy makers have been trying to make, with varying success.

All three authors are comprehensive in scope covering nearly all aspects of agriculture; Cato and Varro write from personal farming experience. Varro, for instance, writes, “My remarks will be derived from three sources: what I have myself observed by practice on my own land, what I have read, and what I have heard from experts” (162). And, in our contemporary age in which environmental policy has become strongly partisan, Varro, Cato, and Virgil offer a long-term view on patriotism: that we prove our love for our country and the depth of our patriotism by preserving the environment. Cato (1935) reminds us that “it is from the farming class that the bravest men and the sturdiest soldiers come, their calling is most highly respected” (3). Similarly, Varro (1935) notes, “What useful product is there which not only does not grow in Italy, but even grow to perfection? ... Is not Italy so covered with trees that the whole land seems to be an orchard?” (171).

2. Defining the Sustainable City

It may be strange to talk about the concept of a sustainable city when discussing Roman agrarian philosophers who wrote two thousand years ago. But indeed, there is a city in existence when Cato, Varro, and Virgil write: Rome. Indeed, Rome’s history is nearly three thousand years old and it has been one of Europe’s, and the Western world’s, oldest, most populated, and continuously inhabited cities. For most of its history, Rome has been an impeccably well-designed metropolis in terms of architecture, transportation

systems, and urban design, as well as the seat of government. One might argue Rome survived through the millennia because it was designed with survival in mind.

Reinventing the city must begin with defining the kind of city that needs reinventing. This would be a reinvention that is sustainable over time. But what is a sustainable city? I define it as a habitat for both human beings and animals within an urban ecosystem that creates economic prosperity for the human population, sustained health for all its inhabitants, while also honoring and preserving natural resources. In other words, a sustainable city recognizes that prosperity is not merely economic in nature; true prosperity should accommodate the needs of the environment too.

A good starting point is the United Nations 2030 Agenda for Sustainable Development that, with its seventeen Sustainable Development Goals and 169 Targets, which devotes an entire goal to “Make cities and human settlements inclusive, safe, resilient, and sustainable” by 2030 (Goal 11). The 2030 Agenda’s sub-goals establish many of the characteristics of the sustainable city: “adequate, safe, and affordable housing” (11.1); “access to safe, affordable, accessible, and sustainable transport systems” (11.2); and “participatory, integrated, and sustainable human settlement planning” (11.3), among others. The sustainable city, then, is both inclusive and participatory in nature—i.e., it is democratic in character—involving all who live on the human settlement. The sustainable city recognizes that while urbanization might be inevitable, it need not be destructive if seen as a project with planned outcomes. Finally, the sustainable city is also sustainable in terms of the economic destiny of its inhabitants: the outlandish wealth of the few is not more important than the livelihood of the many.

Because creating sustainable urban development consists of several local and community-level initiatives, the United Nations 2030 Agenda is pursued more locally by the International Council for Local Environmental Initiatives, more popularly known as ICLEI—Local Governments for Sustainability, a global network of more than 1,750 local and regional governments, active in over 100 countries.

3. Urban Food Security and Food Sovereignty

Roman agrarian philosophers were ahead of their time in talking about food security—or, the measure of ready and easy accessibility to food—and food sovereignty—or, the ownership of the means of food production and distribution by those who consume the food—are integral building blocks of the sustainable city. Cato, Varro, and Virgil write about food in terms of sustaining the human communities who depend on the land. In a pre-industrial age, unreliable weather patterns or sickness among livestock could destroy the local communities who depended on a reliable source of food, leading to an ever-present threat of starvation.

Today, food security and food sovereignty are intrinsically tied to global trade and international politics: for instance, in mid-December 2020, as the final Brexit deal between the United Kingdom and the European Union was still undergoing negotiations, freight trucks carrying food from France into the U.K. were held up in 62-mile-long queues, for days at a time, at the southeastern port of Dover (Reuters 2020). Ultimately, food security and food sovereignty both reflect a socially just society, one that takes into account the needs of its poorest and most vulnerable. One solution is pursuing food autonomy through Alternative Food Networks (AFNs): community gardens, organic food

schemes, fair-trade practices, small family-owned farms, and Slow Food that is locally sourced and produced (as opposed to industrial- and mass-produced Fast Food).

4. Global Temperature Rise

If there is one common overarching theme among all Roman agrarian philosophers, it is paying heed to weather patterns. Two thousand years ago, Cato, Varro, and Virgil each recognized that in the predictability of weather patterns lay the safety of human and animal life. Their caution was prescient. Starting with the Industrial Revolution in the late-eighteenth century and accelerating in the twentieth century, the rapid build-up of greenhouse-gas emissions (methane, nitrous oxide, carbon dioxide, and chlorofluorocarbons, among others) and burning of fossil fuels has increased, and with it, the earth's capacity to trap heat. The resulting "greenhouse effect" has progressively increased temperatures worldwide, each year, even in places where such temperature rise and unpredictable fluctuations would have once been unthinkable (IPCC 2007).

The International Panel on Climate Change (IPCC), established in 1988, is the leading United Nations body for periodic scientific evaluations of human-induced climate change. An IPCC Special Report warns, "Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate" (Valérie Masson-Delmotte et al. 2018). The report expresses "high confidence" for this 1.5°C increase. Severe ecological

consequences will follow a greater than 2°C temperature rise, particularly in regions near the equator—for instance, nearly all the earth’s coral reefs will be gone.

5. Warming Oceans

Roman agrarian philosophers repeatedly stress natural resources and human life are interconnected, and that an imbalance in one, will affect that of the others. Nowhere can we see that warning play out than in the oceans and the cryosphere. Global warming also increases the temperature of the oceans and the cryosphere (the earth’s surface that is solid ice).

The slow warming of the earth’s surface is increasing the temperature of the earth’s water bodies, both the oceans and ice (sea, lake, and river ice; the snow cover; glaciers; ice caps), leading to disastrous consequences for the human population dependent upon these water bodies for both habitat and livelihood. The global ocean has warmed since 1970, absorbing 90% of the earth’s excess heat that is the result of climate change. Since 1993, the rate of ocean warming has doubled, as have marine heatwaves , or periods of extreme oceanic temperatures (H. O. Pörtner et al. 2019).

Since 1982, marine heatwaves have doubled in both intensity and frequency, affecting marine life, flora, and fauna. The ocean absorbs 30% of the carbon dioxide in the atmosphere (National Oceanic and Atmospheric Administration 2020); by absorbing increasing levels of carbon dioxide in the atmosphere, a result of the greenhouse effect discussed above, the ocean has increased its surface acidification—or, the levels of acidity in the water—affecting the lifespan of marine life. Limiting global warming thus

impacts a range of factors related to oceans, reducing the risks to marine biodiversity, fisheries, and marine ecosystems.

6. Rising Sea Levels

The IPCC expresses “high confidence” (2019) that sea levels will continue to rise beyond 2100, a mere eight decades away. This catastrophe is not an eventuality, however; the pace and magnitude of this rise will depend upon future emission pathways, a factor that politicians could determine and control through forward-thinking policy making. But sea-levels’ rise is not relegated to water because urban ecology is not a land-based phenomenon. The greater the rise in sea levels, the greater the impact on small, low-lying islands, deltas, and coastal areas, and the human beings who live on them.

This leads us directly to the United Nations Sustainable Development Goals discussed earlier. The first goal, the pre-eminent one, is “End poverty in all its forms everywhere.” Rising sea levels and the state of the cryosphere affects the human beings who depend on the oceans for their livelihood; this population tends also to be among the most vulnerable to unpredictable climate change: floods, storms at sea, dying fishes due to rising marine temperatures, tsunamis, among others. Currently, 4 million people live permanently in the Arctic region, 680 million live in low-lying coastal areas (land that is less than 10 meters above sea level), and 65 million on Small Island Developing States (SIDS), or developing countries that are on or near the ocean (H. O. Pörtner et al. 2019).

Roman agrarian philosophers stress repeatedly that protecting nature is not simply “nice-to-have,” a feature that seems to have been subsumed into the anti-climate science

rhetoric. Cato, Varro, and Virgil emphasize the economic aspect of agriculture (and fisheries, when we are talking about oceans) affect the human communities who live on the income from land or water bodies.

7. Pandemics and Emergent Infectious Diseases

Animals and human beings have always lived in close proximity to each other, with each species dependent on the other. In the *Georgics*, Virgil writes, “No scruples ever forbade us [...] to set snares for birds [...] or to plunge bleating flocks into the health-giving stream. Oft, too, the driver loads his slow donkey’s sides with oil or cheap fruits” (Virgil 1916, 119). The one fact that has remained unchanged since the days of the Roman agrarian philosophers is that human beings continue to depend on animals for economic and dietary needs, no matter the rapid spread of technology and new means of transportation. In many parts of the world, horses, bullocks, and oxen are still used by the poorest of the poor. Hence Virgil’s reminder to treat these animals well: “[D]o not fodder your unbroken steers only on grass or willow leaves and sedge from the swamp but also add kernels of grain picked by hand” (189).

But, as recent years have shown, pandemics and other Emergent Infectious Diseases (EIDs) such as COVID-19, the Swine Flu, the Ebola Virus, and Zika, spread when living conditions between human beings and animals are so close as to permit the easy spread of human-animal infection. As I write this in 2021, the current COVID-19 pandemic has had ripple effects across the world for over a year, showing vulnerabilities

in the interconnectedness of global economies and the inadequacy of public healthcare systems, many in developed countries.

The close habitat of humans and animals within densely packed urban and suburban areas makes human populations increasingly vulnerable to new strains of EIDs. Pandemics demonstrate also that the socioeconomic impact of extreme events is unequal, skewed by race, ethnicity, location, and economic vulnerability (Keating, Cha, and Florit 2020). Regions and populations already poor and disenfranchised tend to descend even further into poverty when faced with public health crises.

8. Policy Challenges

Cities face two main challenges in implementing climate policy: financing and adaptation. Adaptation is “the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” (IPCC 2018, “Glossary”). Financing for climate change has often meant high-income or developed countries have had to bear some of the burden of funding the efforts of developing countries to ensure parity in adaptation efforts, so that developing countries are not left behind.

The Cancun Agreements (2010) and the Paris Agreement (2015) have been instrumental in such multilateral financing efforts. The Cancun Agreements included a collective annual goal by developed countries of jointly mobilizing \$100 billion by the year 2020 to support developing countries in their climate change efforts (United Nations Framework Convention on Climate Change 2010, 17), stating further that “funds

provided to developing country Parties may come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources” (1/CP.16§99). The Paris Agreement (2015) emphasizes this collective annual pledge through 2025, the year when the next meeting of the United Nations Framework Convention on Climate Change is scheduled.

The question arises: Why is such multilateral, joint financing important? The answer lies in the second challenge faced by cities: adaptation. While adaptation measures are often tracked at the national level, such tracking is negligible at the level of each individual city. While nearly every country is implementing climate-change adaptation policies, systematic tracking for data collection, assessment, and evaluation within cities has become a challenge. This policy measure, called “adaptation tracking,” involves the global tracking of adaptation measures to prepare for climate change across cities, countries, and entire regions. Malcolm Araos et al. (2016) describe the “4Cs” of adaptation tracking as consistency, comparability, comprehensiveness, and coherency (376). In other words, unless data on adaptation policies across cities can be measured and evaluated in comparable units by establishing a global baseline, very little useful knowledge can be derived from them for practical application.

10. Policy Recommendations

The time period spanning the late-Roman Republic through the Augustan period, roughly the years between 133 BCE and 31 CE, see a profusion of agrarian philosophers—Vegetius, Columella, Pliny, Columella—in addition to Cato, Varro, and

Virgil. The profusion of these agrarian advice manuals in a pre-urban and pre-industrial world tells us the advice was considered important enough to record and pass down to teach future generations to preserve what was limited. This overarching impulse, to preserve and protect and nurture what nature provides, has been lost or, perhaps more accurately, left behind on civilization's upward march, perhaps because after the Industrial Revolution in the eighteenth-century, human beings were emboldened by the possibility that machines could create what nature could not, replicate better than nature itself.

The writings of Roman agrarian philosophers often represent farmers' notebooks, but replete with instructions important enough to write down and bequeath to the next generation. It might be worth distilling the essence of their advice for environmental policy makers today.

1. Unitary intervention systems: Roman agrarian philosophers describe nature as a unified system. Each constituent part of the system—the land, trees, water, birds and bees, fish and fowl, horses, cattle and livestock—forms one whole natural system and not separate parts. This is a useful approach in rejuvenating our cities. For instance, urban green spaces such as trees, parks, and community gardens, developed in particularly high-carbon-emission areas, offer health benefits, both physical and cognitive, in addition to conferring environmental benefits (Kathleen L. Wolf et al. 2020, 8). Parks, gardens, and man-made lakes confer social benefits too: they become spaces for congregation and physical exercise. Thus, future policy interventions must include nature into public health planning.

2. Adaptation and adaptation tracking: Adaptation efforts are advance interventions to potential climate-based changes. It is “the process of adjustment to actual or expected climate and its effects” (IPCC 2018). Roman agrarian philosophers stress the importance of adjustment to anticipated changes in nature, and that nature’s cyclicity may be used for human benefit if we work with, and not against, this cyclicity. This, in short, is the essence of adaptation.

3. Resilience: This is the “capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning, and transformation” (IPCC 2018). Stephen Tyler and Marcus Moench describe three characteristics of urban climate resilience:

- a) Strengthening systems to reduce their fragility in the face of climate impacts and to reduce the risk of cascading failures;
- b) Building the capacities of social agents to anticipate and develop adaptive responses, to access and maintain supportive urban systems; and
- c) Addressing the institutional factors that constrain effective responses to system fragility or undermine the ability of agents to take action (Tyler and Moench 2012, 319).

As cities become complex systems, developing resilience to system-wide shocks, whether human or natural, becomes increasingly important.

4. Vulnerability: This refers to the likelihood or predisposition of a complex system to come to harm. Roman agrarian philosophers recommend building invulnerability, or the ability to adapt and cope quickly, on an ongoing basis. Indeed, their advice, written for a pre-industrial society, is based on the understanding that human beings are dependent upon natural and weather patterns, and that unpredictable changes in these patterns renders us vulnerable. Reducing vulnerability increases resilience (#3 above), but doing so requires constant evaluation of exposure, by stress testing—or, systematic and periodic tests designed to assess in advance whether a system will survive when faced with unusual pressures—at both local and global levels.

5. Planning: While they may be unlikely sources of advice today, Roman agrarian philosophical texts each recommend sound planning practices. They tell us a good harvest or successful animal husbandry is not the result of random chance but of strategic, advance planning. Today, as urban populations grow, more cities than ever need formal planning practices. Such plans need the collaboration of local groups and institutions that know their vulnerable populations best. In other words, interdisciplinary stakeholders need to create evidence-based interventions at the local level.

6. Creating green urban spaces and other nature-based solutions: In contrast with the traditional grey, steel-and-concrete structures within urban jungles, green spaces offer health benefits in addition to being visually pleasing (Barron et al. 2019, 11). Finding nature-based solutions at the intersection of environmental policy and public health is a rich future area of research. However, these solutions require concerted, coordinated

efforts at local and municipal levels, and multiple layers of cooperation, such as between green-space managers, urban planners, designers and architects, and local health authorities, all of which is currently without precedent.

Acknowledgement: I am grateful to John Morillo for encouraging an interest in Roman agrarian philosophy and for his insightful comments on an earlier version of this project.

References

Araos, Malcolm, Berrang-Ford, Lea, Ford, James D, Austin, Stephanie E, Biesbroek, Robbert, and Lesnikowski, Alexandra. 2016. "Climate Change Adaptation Planning in Large Cities: A Systematic Global Assessment." *Environmental Science & Policy* 66: 375-82. <https://doi.org/10.1016/j.envsci.2016.06.009>

Barron, Sara, Sophie Nitoslawski, Kathleen L. Wolf, Angie Woo, Erin Desautels, and Stephen R.J. Sheppard. 2019. "Greening Blocks: A Conceptual Typology of Practical Design Interventions to Integrate Health and Climate Resilience Co-Benefits." *Int. J. Environ. Res. Public Health* 16, no. 21, 4241: 1-21. <https://doi.org/10.3390/ijerph16214241>.

Cato, Marcus Porcius. *Marcus Porcius Cato, On Agriculture*. 1935. Translated by

William Davis Hooper. Revised by Harrison Boyd Ash. Loeb Classical Library
283. Cambridge, MA: Harvard University Press.

Dennis, Brady, Juliet Eilperin, and Dino Grandoni. November 4,
2020. “As U.S. leaves Paris Accord, Climate Policy hangs on Election Outcome.”
The Washington Post. <https://www.washingtonpost.com/climate-environment/2020/11/04/climate-change-election-paris-agreement/>.

The Earth Observatory. “World of Change: Global Temperatures.” Accessed January 12,
2021. EarthObservatory.nasa.gov. <https://earthobservatory.nasa.gov/world-of-change/global-temperatures>.

“Economists’ Statement on Carbon Dividends.” Accessed January 13, 2021. Climate
Leadership Council. <https://clouncil.org/economists-statement/>.

Encyclopedia Britannica. February 06, 2020. “Roman Empire.”
<https://www.britannica.com/place/Roman-Republic>.

Encyclopedia Britannica. December 11, 2020. “Augustus.”
<https://www.britannica.com/biography/Augustus-Roman-emperor>.

ICLEI. “Our pathways, our approach.” Accessed February 20, 2021. ICLEI.
https://www.iclei.org/en/our_approach.html.

International Food Policy Research Institute. “Food Security.” Accessed February 20, 2021. International Food Policy Research Institute.
<https://www.ifpri.org/topic/food-security>.

IPCC Fourth Assessment Report: Climate Change 2007. Accessed February 20, 2021.
“FAQ 1.3 What is the Greenhouse Effect?” IPCC.
https://archive.ipcc.ch/publications_and_data/ar4/wg1/en/faq-1-3.html.

IPCC. “Global Warming of 1.5°C.” Last modified February 2019. IPCC.
https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Headline-statements.pdf.

IPCC, 2018: Annex I: Glossary [Matthews, J.B.R. (ed.)]. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)].
In Press

Keating, Dan, Ariana Eunjung Cha, and Gabriel Florit. Last modified November 20, 2020. “‘I just pray God will help me’: Racial, ethnic minorities reel from higher covid-19 death rates.” *The Washington Post*.
<https://www.washingtonpost.com/graphics/2020/health/covid-race-mortality-rate/>.

Masson-Delmotte, Valérie, et al., eds. 2018. IPCC, 2018: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. In Press.

National Family Farm Coalition. Accessed February 20, 2021. “What is Food Sovereignty?” National Family Farm Coalition. <https://nffc.net/what-we-do/food-sovereignty/>.

National Oceanic and Atmospheric Administration. Last modified April 2020. “Ocean acidification.” National Oceanic and Atmospheric Administration.
<https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification>.

Pörtner, H. O. et al., eds., 2019. IPCC, 2019: Summary for Policymakers. In: *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*. In Press.

Reidmiller, D. R. et al. 2018. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. Washington, D.C.: U.S. Global Change Research Program. doi: 10.7930/NCA4.2018.

Reuters Staff. Last modified December 10, 2020. “As Brexit cliff edge looms, miles of trucks stack up near southern English port.” Reuters.

<https://www.reuters.com/article/uk-britain-eu-trucks/as-brexit-cliff-edge-loom-miles-of-trucks-stack-up-near-southern-english-port-idUSKBN28K2PW>.

Tyler, Stephen, and Marcus Moench. 2012. “A Framework for Urban Climate Resilience.” *Climate and Development* 4, no. 4: 311-26.

<https://doi.org/10.1080/17565529.2012.745389>.

United Nations Department of Economic and Social Affairs. Accessed February 14, 2021. “The 2030 Agenda for Sustainable Development.” United Nations.

<https://sdgs.un.org/2030agenda>.

United Nations Framework Convention on Climate Change. Last modified March 15, 2011. *Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010*. UNFCCC.

FCCC/CP/2010/7/Add.1.

<https://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>

Varro, Marcus Terentius. 1935. *Marcus Terentius Varro, On Agriculture*. Translated by William Davis Hooper. Revised by Harrison Boyd Ash. Loeb Classical Library 283. Cambridge, MA: Harvard University Press.

Virgil. 1916. *Eclogues. Georgics. Aeneid: Books 1-6*. Translated by H. Rushton Fairclough. Revised by G. P. Goold. Loeb Classical Library 63. Cambridge, MA: Harvard University Press.

Wolf, Kathleen L., Sharon T. Lam, Jennifer K. McKeen, Gregory R.A. Richardson, Matilda van den Bosch, and Adrina C. Bardekjian. 2020. "Urban Trees and Human Health: A Scoping Review." *International Journal of Environmental Research Public Health* 17, no. 12, 4371 (2020): 1-30.
<https://doi:10.3390/ijerph17124371>.