The Malthusian model

The debate about the consequences of climate change has come to play a dominant part in international political discourse about the future of armed conflict. While climate change itself is a relatively new issue, the main theme of the debate is not. It has roots in the writings of Thomas Malthus over 200 years ago and the responses to his pessimistic assessment of the human condition.

The original model (Malthus, 1798) was striking in its simplicity. Population would increase in a geometric progression, resulting in exponential growth. Food production, on the other hand, could only increase in an arithmetic progression, with linear growth. Regardless of the starting point, the two curves must eventually intersect, and food will become scarce. Even a country with an abundant food supply will at some point be hit by severe scarcity. Malthus posited that this could be countered by what he called 'preventive checks', a lower birth rate resulting from celibacy, birth control, abortions, or infanticide. Alternatively, by 'positive checks', a higher death rate through war, famine, and pestilence. Thus, the consequences for armed conflict and other key aspects of human security formed part of Malthusianism from the start.

This message was controversial when first published (cf. Goodwin, 1820). However, the slow erosion of traditional Malthusianism occurred mainly because of the phenomenal increase in food production thanks to selective breeding of plants and animals, mechanization of agriculture, and – more recently – the Green Revolution. Improved nourishment and better health led to lower mortality, particularly among infants. At first glance, this might seem to exacerbate the situation by promoting population growth. Indeed, Malthus had assumed that the availability of more food would exacerbate population pressure and misery. However, the decline in mortality was eventually followed by a second demographic transition with declining fertility. In every European country, fertility is now below replacement level at an average of 2.1 children born to each woman.1 Developing countries have followed suit more rapidly than demographers had thought possible. Countries in sub-Saharan Africa, and to a lesser extent in the Middle East and North Africa, have higher birth rates, but even here it is declining. Of course, as long as incoming cohorts are larger than outgoing, total population will continue increasing. But falling fertility is now expected to lead to stabilization during the 21st century and eventually a reduction in global population. When Ehrlich & Ehrlich (1972) declared that 'the battle to feed humanity is over' and predicted mass starvation even in industrialized countries, the annual growth of world population had just reached a peak at more than 2%. Fifty years later, the growth rate is down to about half of that and still declining.2 For the European Union it was no more than 0.2% in 2018. The term 'population explosion' has retreated to the back of public discussion, although it can still be applied to some countries and to expanding urban areas. While Thomas Malthus is increasingly recognized as a founding father of demography, his basic model has not fared well over time.

NeoMalthusian concerns

Despite this, rising environmentalism for the past 50 years has revived concerns that may properly be labeled neoMalthusian, even though its adherents generally dislike the label. Not limited to the food supply, neo-Malthusianism focuses on a wide set of scarcities arising from increased resource consumption and depletion. Over 150 years ago, Jevons (1865) expressed fears that economic progress in Great Britain would be reversed because the country would run out of coal. More recently, the best-selling Limits to Growth (Meadows et al., 1972) argued that comparisons of current use of important non-renewable resources like gold, iron, and oil to available stocks were deficient in not considering the increasing use of such resources. Key minerals and other resources were likely to run out much earlier than previously anticipated,

leading to harmful scarcities before the turn of the century. More recent revisions of the model and the data have put the critical dates further off, but the authors stick to the same basic message.

This perspective was reflected in academic writing by Homer-Dixon (1999) and others. Klare (2001) foresaw increasing global conflict over scarce mineral resources and particularly oil. Widespread concern about 'water wars' (Gleick & Heberger, 2013; Katz, 2011) was epitomized in the statement by a Vice President of the World Bank in 1995 that the wars of the 21st century would be over water (Serageldin, 2009). The threat of resource scarcity was also a central concern of policy documents like the Brundtland report (1987) on environment and development. The growing environmental movement framed its key concern as a question of pollution, which is intimately related to resource scarcity. Polluting the water leads to scarcity of clean water. Agricultural or industrial land use leads to a scarcity of unspoiled nature and safe habitats for living organisms. Increasingly, the environmental movement (and particularly the 'deep ecology' tradition) ascribes value to nature per se (Vetlesen, 2015). Nevertheless, the academic and political discussion about the consequences of environmental change is largely anthropocentric, centering on the implications of pollution for health and human livelihood.

The neoMalthusian perspective occurs regularly in the discussion of non-renewable resources like oil and scarce minerals (cf. the 'peak oil' movement). But it has also been widely applied to renewable resources like food and fresh water, based on fear that production will not keep track with expanding consumption. By contributing to environmental decay, pollution exacerbates scarcities. Particularly when seen through the prism of the precautionary principle, these problems provide a strong motive for action.

Some resources such as territory, shelter, food, water, and energy sources are essential to human civilization. These might be considered resources worth fighting for. Conflicts over fisheries resources in the North Atlantic were dubbed 'cod wars', even though there has been little if any actual fighting.

The response from environmental optimists[1]

Critics of the neoMalthusian model such as Boserup (1965), Maddox (1972), Simon (1996), and Lomborg (2001) do not have identical agendas, analyses, and solutions, but I extract from their writings four key points (Gleditsch, 2003). First, as noted, the observation that world population will eventually stabilize and even decline. Rather than overpopulation, ageing and population decline will become more important social problems in the future.

Second, the promise of technological progress. Humans learn to do things in new ways, to recycle, and to produce more while using fewer resources. Investments in science and technology help us overcome the race to scarcity. Technological progress contributes to more efficient use of raw materials, but also the development of new materials and new uses of old. Shipbuilding is no longer constrained by the scarcity of oak trees, and the bottling of wine is not limited by a lack of cork.

[1] The leading school of opponents to neoMalthusianism has generally been labeled as 'cornucopian'

Third, the market mechanism contributes to more efficient use of resources. If scarcities develop, prices rise and facilitate substitution and technological shifts. Of course, preventing scarcities and environmental degradation cannot be left to the market alone, but a policy that encourages the market mechanism to work when scarcities develop, will help to alleviate particularly detrimental effects of scarcity.

A final counter-argument is that neoMalthusianism fails to take account of the effects of national policy and international cooperation. Facing local food scarcity, regional, national, or international authorities can move resources into the area, to prevent hunger from becoming a famine. A well-functioning nation has effective institutions to ensure that such cooperation takes place. While still a colony of Britain, India suffered catastrophic famines, most recently the Bengal famine of 1943 with some two million fatalities. As an independent democracy, India still experiences widespread malnutrition, but has avoided major famines. The international system is much less tightly organized, but it is far from unorganized. Special agencies of the United Nations and other international governmental organizations serve to coordinate global responses to challenges in such areas as food security, health, and education. The network of international nongovernmental organizations has also grown immensely from some 6,000 to an estimated 40,000 just in the last two decades. Taken together, these four points form the core of a more optimistic worldview.

Climate change – a game changer?

Climate change is often framed as an unprecedented problem emerging in a mature stage of the Anthropocene. As Wagner & Weitzman (2015: 8–10) argue, it is 'uniquely global', 'uniquely long-term', and 'uniquely irreversible'. Yet, concern about the social effects of irregular weather patterns and changing climate is not a new phenomenon. Severe winters and cool and rainy summers have frequently led to starvation, such as the Great Famine of 1315–17. Many such phenomena were caused by relatively short-term variations in weather, but a period of several centuries with lower temperatures followed, frequently called the 'Little Ice Age'. The collapse of the Nordic settlements in Greenland in the 15th century was certainly climate-related, at least in part (Kintisch, 2016). Long-term historical studies (such as Zhang et al., 2010) suggest that wars and regime changes are more common in cold periods. More drastically, the ice ages, including the most recent one that ended some 10,000 years ago, completely changed the topography of North Europe and North America and eliminated not only whatever habitation existed before but also any discernable traces of it. In the early 1970s, fear of another impending ice age briefly emerged and on this basis a CIA (1974) report predicted 'famine and starvation' in many areas of the world, as well as 'mass movement of people across borders'.

Of course, the 1970s fear of a new ice age turned out to be a blind alley in the development of climate science. In recent decades, public concern has focused on the prospects of global warming, accumulating a much more solid basis in scientific evidence. A key element is the growing realization that the current warming is caused to a very large extent by human activities, notably the emission of greenhouse gases. In 1988, the World Meteorological Organization and the United Nations Environment Programme set up the Intergovernmental Panel on Climate Change (IPCC) for assessing the rate of climate change, its causes and effects, and the prospects for mitigation and adaptation. The Panel does not conduct its own research but assembles and integrates knowledge from the relevant scientific literature, preferably peer-reviewed publications, and judges the probability of physical and social consequences of global warming.

While the concern for the effects of global warming is new, the underlying argument about armed conflict and other social consequences bears extensive similarities to the traditional neoMalthusian argument. Indeed, as Meierding (2013: 186) points out, 'quantitative climate

change–conflict researchers usually import arguments from earlier environmental conflict studies or from the civil wars literature' and the same would seem to apply to the non-quantitative literature as well. Once again, even though climate change is not a traditional pollution issue, the fear of developing scarcities is at the core. The IPCC reports that a warmer climate will lead to more drought and be detrimental to agriculture, particularly rain-fed agriculture in Africa and the Middle East. Excessive temperatures may drive people away from their traditional homelands and force them to become migrants, leading to competition for scarce resources in their countries of arrival. Other parts of the world may be more affected by excessive rainfall, leading to floods that will negatively affect human habitation and livelihoods. More generally, a warmer climate will increase the probability of natural disasters such as storms and hurricanes. Rising sea levels will threaten low-lying areas as well as coastal cities and may make small low-altitude islands uninhabitable. The warming of the oceans will also impact the world's fisheries, with possible consequences for another important component of food security (IPCC, 2019b).

The first reports from the IPCC paid little direct attention to armed conflict. The Third Assessment Report (IPCC, 2001) made a few references to the potential for climate change-induced conflict, mainly water wars, conflicts generated by migration, and resource wars. The report had a weak basis in peer reviewed literature. The Fourth Assessment Report (IPCC, 2007) contained even fewer references to armed conflict. The Fifth Assessment Report (AR5) included a chapter on human security with a 4.5-page section on conflict, which noted that 'collectively the research does not conclude that there is a strong positive relationship between warming and armed conflict' (IPCC, 2014: 772). The report also noted 'high agreement' that 'in the specific circumstances where other risk factors are extremely low [. . .], the impact of changes in climate on armed conflict is negligible.' The Africa chapter noted the possibility of water conflict. A chapter labeled 'Detection and attribution', devoted to assessing the robustness of relationships reported in other chapters, dismissed the link from climate change to violence out of hand. More recent reports from IPCC do not deal extensively with armed conflict, although it is briefly mentioned in the special reports on the impact of 1.5 degree global warming (IPCC, 2019a: 245), on the oceans (2019b: 30), and on land use (2019c: 23, 25), and neither will AR6 (IPCC, 2021).

While there is wide agreement that climate change poses large challenges to human security in a broad sense (IPCC, 2014, WG II: Ch. 12), the academic literature on climate change and armed conflict remains divided (Koubi, 2019; Mach et al., 2019). A common feature in most of the relevant research is that hypotheses about increasing scarcities provide the starting point regardless of whether the authors conclude in favor of a positive relationship or not. Key scarcities are reductions in arable land and a declining supply of food, fresh water, and the yield of fisheries. Important mechanisms assumed to generate increased scarcity from climate change are cross-border migration, domestic rural-to-urban migration, rising inequalities, interethnic tensions, climate changes that affect different groups unequally, preexisting competition for scarce goods, competing claims to resources, and the response or lack of response of national and international authorities.

If climate change were to lead to greater abundance in some areas (despite an overall decline), groups could have been assumed to fight over increased spoils, as in models of conflict driven by opportunity rather than grievance (Collier & Hoeffler, 2004). Alternatively, the link between climate change and violence could have been derived from the literature on heat and aggression (Anderson, 2012), which suggests that higher temperatures will lead to physical violence at the level of individuals and groups.

As noted by Busby (2021), climate change has become a prominent policy concern for the international community. President Barack Obama, several Secretaries-General of the UN, and

other prominent figures have argued that climate change is likely to increase the risk of violent conflict, and similar concerns are widely voiced by the environmental movement. The Extinction Rebellion lists sea-level rise, desertification, water shortage, and crop failure as unprecedented effects of the present climate and ecological disruptions. The environmental activist Greta Thunberg claimed, in a dramatic speech to the UN General Assembly, that because of climate change, 'People are suffering. People are dying.' Public support can be found even for quite extreme views. For instance, a YouGov poll in July 2019 found that a majority in the USA and nine European countries thought that it was likely ('quite likely' or 'very likely') that climate change would cause small wars, around one-third thought that it would cause a new world war, and about as many that it would result in the 'extinction of the human race'. In ten countries in Asia, the pessimism was even more pronounced.8 David Wallace-Wells (2019), in a book tellingly titled The Uninhabitable Earth, attempts to demolish the line between alarmism and realism. And because the effects of human-induced climate change are quite unprecedented, there may be a limit to what can be learned by looking to earlier environmental debates (Meierding, 2013: 200).

The optimists' responses to climate change

The most extreme contrarian position is, of course, to deny one or both key conclusions of the IPCC: the reality of global warming or the human contribution to it. However, most environmental optimists accept these two key conclusions but raise other problems with the panel's discussion of the social effects of climate change and even more so with popular interpretations of the panel reports. For instance, Hausfather & Peters (2020), by no means 'climate deniers', decry the common use of choosing the high-risk RCP8.5[2] to illustrate 'business as usual' as misleading. The causal chains from climate change to the proposed effects on human beings are long and complex, and the uncertainty increases every step of the way. In the literature on the social effects of climate change, including the IPCC reports, statements abound that something 'may' lead to something else, or that a variable 'is sensitive to' another, without any guidelines for how to translate this into probabilities (Gleditsch & Nordes, 2014: 87f). Uncritical use of the precautionary principle, where any remotely possible calamity unwittingly becomes a probable event, is not helpful. Gleditsch & Nordes (2014: 85) note that while AR5 (IPCC, 2014) did not find strong evidence for a direct link between climate change and conflict, it argued that climate change is likely to impact known conflict inducing factors like poverty and inconsistent political institutions and therefore might have an indirect effect on conflict. But this assumes that correlations are transitive, which is not generally the case. If A correlates with B and B with C, we know nothing about how A relates to C unless both correlations are extremely high. The strongest case for the climate–conflict link is the effect of interaction between climate change and factors like poverty, state failure, or ethnic polarization. It may be more cost-effective to try to deal with these other risk factors than with global warming itself if the goal is to reduce the 'risk multiplier' effect of climate change on armed conflict.

For instance, Ide, Kristensen & Bartusevicˆius (2021) conclude that the impact of floods on political conflict are contingent on other factors such as population size and regime type. Moreover, most of the articles do not assume that scarcities are likely to arise at the global level. They may be regional (mostly in Africa), national, or local. Urban and rural areas may be affected by different scarcities. Climate change may also affect particularly strongly groups that

[2] RCP = Representative Concentration Pathway, a scenario for greenhouse gas emissions and temperature increases up to 2100. RCP8.5 represents a fossil-fuel intensive future without any climate mitigation policies, leading to nearly 5 C of warming by the end of the century.

are already at an economic or political disadvantage. The effects can be alleviated and adaptations constructed at these levels.

The argument about how climate change may indirectly impact conflict leans heavily on the negative economic consequences of climate change, but with little or no reference to the research that explicitly deals with this topic. In fact, the relevant chapter in AR5 concluded that for most sectors of the economy, the impact of climate change was likely to be dwarfed by other factors. Tol (2018) finds that the long-term global economic effects are likely to be negative, but that a century of climate change will have about the same impact on the economy as the loss of one year of economic growth. Other economists are more cautious, but the dean of climate change economics, William Nordhaus (2018: 345, 359), estimates that 'damages are 2.1 percent of global income at 3 C warming and 8.5 percent of income at 6 C', while also warning that the longer the delay in taking decisive action, the harsher the necessary countermeasures. Stern (2006) is more pessimistic, based mainly on a lower discount rate (the interest rate used to calculate the present value of future cash flows) as are Wagner & Weitzman (2015). Heal (2017) argues that the Integrated Assessment Models generally used in the assessment of the economics of climate change are not accurate enough to provide quantitative insights and should not be taken as serious forecasts. Yet, all these economists take the basically optimistic view that climate change is manageable with appropriate policies for raising the price on the emission of greenhouse gases. With a chapter heading from Wagner &Weitzman (2015: 17): 'We can do this'.

This more optimistic assessment of climate change does not assume that the challenge will go away by itself or can be left to the market. A plausible approach, favored by most economists, is the imposition of a robust and increasing price on carbon emissions (whether as a carbon tax or through a cap and trade scheme) high enough to reduce the use of fossil fuels and encourage the search for their replacement. More than 25 countries had such taxes by early 2018 (Metcalf, 2019), but generally not at a level seen as necessary for limiting global warming to, say, 2 C. This approach relies on the use of the market mechanism, but with targets fixed by public policy. Income from a carbon tax can be channeled back to the citizens to avoid increasing overall taxation. To speed up the transition, funds can also be allocated to the research and development of cheaper and more efficient production of various forms of fossil-free energy, including nuclear power (Goldstein & Qvist, 2019).

The response of the environmental optimists continues to emphasize the role of innovations; technological innovations, such as improvements in battery technology, the key element in the 2019 Nobel Prize in chemistry, but also social innovations, as exemplified by the experimental approach to the alleviation of poverty, rewarded in the same year by the Nobel Prize in economics.

While the most important countermeasures will be directed at the mitigation of climate change, there is also a strong case for adaptation. If sea-level rise cannot be totally prevented, dikes and flood barriers will be cost effective and necessary, at least in high-value urban areas. If parts of Africa suffer from drought, there will be increased use for new crops that are more suitable for a dry climate, possibly developed in part by GMO technology. Industrialization in Africa can decrease the one sided reliance on rain-fed agriculture, as it has in other parts of the world, which have moved human resources from the primary sector to industry (and then to services). Continuing urbanization will move millions out of the most vulnerable communities (Collier, 2010). While structural change failed to produce economic growth in Latin America and Africa after 1990, Africa has experienced a turnaround in the new millennium (McMillan & Rodrik, 2014) and there are also potentials for increasing productivity by structural change within agriculture in Africa (McCullough, 2017).

NeoMalthusians will not necessarily be convinced. For instance, they are unlikely to be persuaded of a bright future based on averages. Like globalization, climate change will have winners and losers. Policies for mitigation and adaptation alike will have to take account of those who are likely to be most severely and negatively affected – and, not coincidentally, they will tend to be those who are already affected by poverty, poor governance, and conflict. They are also among the least powerful when it comes to setting the agenda for global policy on climate change. Some proposed strategies for reining in greenhouse gas emissions, such as the increasing use of biofuels in highly developed countries, may also inadvertently contribute to increased scarcities and attendant risks of conflict elsewhere (Dunlap & Fairhead, 2014). The optimists respond that a world where hundreds of millions have lifted themselves out of poverty in just a few decades, where life expectancy has increased by a factor of more than 2.5 in 150 years, where a higher proportion than ever live under democratic rule, and where advanced economies have been able to deal with many traditional environmental problems (such as polluted lakes, poor sanitation, streets full of horse manure) can also afford to deal with new negative by-products of modern civilization (Easterbrook, 1995; Pinker, 2018; Rosling, 2018). The acknowledged uncertainties in the climate models, and even more so in the assessment of social effects of changes in the natural environment, can cut both ways. These critics view the IPCC reports as leaning excessively towards pessimism, driven by an alliance of activists and scholars funded by politically driven research programs, while neoMalthusians see them as overly cautious because the IPCC has to watch its step in order not to offend governments that are, at the end of the day, its owners. Thus, uncertainty itself is a major negative externality of global warming and a major contributor to human insecurity as shown by many public opinion polls.

Compared to previous rounds of the environmental debate between pessimists and optimists, the stakes seem higher this time because of the global nature of the problem and the temptation to engage in free-riding in the efforts to reduce the emissions of greenhouse gases. Yet, the debate continues along the same dividing-lines. The pessimists are often charged with alarmism and misanthropy; the optimists are accused of complacency. Both indictments have some plausibility. Further polarization of the debate will lead us nowhere. But perhaps we can hope for a fusion of the neoMalthusian concern and passion with the optimists' emphasis on finding constructive solutions?