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A Hippocratic oath is needed for the unborn

PERSPECTIVES

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Climate change is the biggest health challenge in the world today. It poses a steadily increasing direct and indirect threat to future generations.

A comic strip published in spring 2020 encapsulates an important aspect of the situation we now face: two men in white coats are pondering over the COVID-19 figures. One remarks to the other 'I'll be glad when this is over'. What neither of them is seeing is the far more dramatic climate figures that are covertly rising like tidal waves. The *Lancet Countdown on health and climate change* claims that 'climate change is the greatest global health threat facing the world in the 21 st century, but it is also the greatest opportunity to redefine the social and environmental determinants of health' (1, 2). In Norway, the same claim was made in this journal ten years ago (3). In the years since, the claim has been reinforced.

The recent sixth assessment report from the Intergovernmental Panel on Climate Change (IPCC) states that the world is now hotter than it has been for 125 000 years, and current CO_2 concentrations are the highest for two million years (4). The current emission pathway indicates a temperature increase of 3^0C by the year 2100. It is not known what extremes await us, even with the 2^0C increase that the more optimistic estimates suggest. At the current rate, the increase will exceed 1.5^0C in a couple of decades. Even the most conservative scenarios consider a temperature increase of 2^0C to be quite likely by the year 2050 – with the current level of emissions. As expected, the report also points to not only a likely increase in the extreme events we are already seeing, but

also suggests that these will become more widespread: floods that happened every 1000 years will be seen every 100 years, and more areas will be exposed to them.

Ecosystems have served us extraordinarily well so far with their net carbon capture. In fact, more than half of our emissions are absorbed by ecosystem sequestration. If the ability of nature to absorb CO_2 is weakened or, in the worst case, reversed, we will really have problems. One of the most frightening topics in the IPCC report is the risk of a reversal in the net terrestrial and marine CO_2 uptake to a net emission to the atmosphere. We are already seeing the outlines of this in the reduced ability for CO_2 uptake in tropical forests, CO_2 emissions (in the worst case also methane (CH_4)) from increased thawing of permafrost, wildfires and warmer and more acidic oceans. Such self-reinforcing feedback loops can lead to climatic tipping points. It is not therefore 'only' a matter of CO_2 and the climate, but also about the loss of nature and the resulting weakening of ecosystem services such as CO_2 uptake, carbon storage and flood control.

Climate is the main threat

Nothing is as potentially threatening to public health as climate change. It has already directly claimed numerous victims as a result of flooding, fires and extreme heatwaves, but the IPCC report warns this is just a precursor of what is to come. The indirect effects will be even greater because the disease, water and food shortages, poorer sanitation and migration resulting from the deteriorating living conditions, extreme heat, fires and rising sea levels will in themselves constitute major social and health challenges.

The term 'climate refugee' has already been established, and these refugees could stem from different regions for different reasons.

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The European Commission describes this clearly in its report *Proposed Mission: A Climate Resilient Europe* (5): 'The COVID-19 pandemic has taught a lesson about how closely environmental, societal and human health are connected. What we have lived through and still will is a mild foretaste of the shocks that climate change may and will cause in the future.' This holistic approach is also highlighted in the EAT-Lancet report, which perfectly demonstrates the close links between health and food production, nutrition, land use and the climate (6).

Similarly, the Norwegian Environment Agency writes in its note on climate change and health that 'Norway's population is generally in good health, and in terms of health we are relatively well equipped to counteract the effects of climate change. Nevertheless, more precipitation, heatwaves and droughts will have an impact on our health.' (7) The report puts the impact of flooding and

landslides on health (death, injuries, blocking of emergency vehicles) at the top of the list, followed by heatwaves, new diseases, reduced food supply, more allergies and poorer air quality, release of toxins from soil and landfills, and a greater need for pesticides.

The habitable niche

Apart from the severe consequences of climate disasters like floods, landslides, fires, death from heat stroke is also becoming an increasingly relevant problem, even in areas where this has never previously been seen. For example, compare the extreme temperatures up to 50 °C that were recorded in Canada in early summer and subsequently on the west coast of the United States, and the record temperatures in Europe in late summer. We have already seen heatwaves that resulted in tens of thousands of deaths (8), and 'wet-bulb' temperatures in excess of 35 °C are expected to become more frequent and widespread, leading to an exponential rise in deaths from heat stroke.

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The wet-bulb temperature is measured based on air temperature and relative humidity. A higher humidity increases the risk of high temperatures causing death from heat stroke, due to the body's inability to get rid of excess heat. This is just one of the many factors included in the calculations of which parts of the planet will become uninhabitable under different climate scenarios (9). Although the human race inhabits most parts of the planet with climatic extremes, the human climate niche is relatively narrow at the hot end in terms of food supply, water and temperature tolerance. It is estimated that 1–3 billion people may end up outside the habitable niche in the course of 50 years (9). Put bluntly, the choice is between relocation, where this is possible, and a high risk of death from heat stroke. It is also worth remembering that extreme temperatures, droughts, fires and floods also mean enormous losses for the planet's other forms of life.

Climate and coronavirus

On 5 March 2020, a political commentator for the Guardian newspaper, Owen Jones, asked: 'Why don't we treat the climate crisis with the same urgency as coronavirus?' As he pointed out, the climate crisis not only has the same serious ramifications for health and the economy as the coronavirus epidemic, but it is in fact far more serious already. It will also continue to develop over time, whereas the pandemic will end at some point.

Of course, Owen was not alone in asking this question. However, the explanation is obvious: COVID-19 represents a clear and present danger. The iconic representation of a globe with red tentacles made the invisible virus

visible to us, making it even more concrete. COVID-19 has an immediate effect, and the disease also affects people we know. Yes, *you or I* could get sick. The pandemic is also having a direct effect on our lives in the form of lockdowns, lost jobs, travel restrictions, hand hygiene and face masks, as well as a general curtailment of our civil liberties. For many weeks, the daily news coverage was dominated by worried-looking politicians and health chiefs emphasising the severity of the situation. This led to a 'collaborative effort' among the population, in which we accepted the draconian restrictions imposed upon us. Even our treasured cabin trips during the Easter holidays had to be dispensed with. The advice from the experts was followed; something that climate policy decision-makers could learn from.

It is not so strange that this is how things are. We are evolutionarily conditioned to deal with clear and present danger. Both as individuals and as communities we are good at this, but we are equally bad at material renunciation for the good of humanity and those who have yet to be born. We need policies, including within health care, that have a long-term perspective and take into account long-term climate risks.

Loss of nature leads to zoonoses and pandemics

As discussed, the loss of nature and climate change are closely linked, and encroachment on nature also increases the risk of pandemics. A comprehensive analysis of 6800 ecosystems on six continents shows the mechanisms that link the destruction of nature and pandemics (10). Ebola, AIDS and rabies, and a host of other diseases, such as MERS, SARS, influenza A (H1 N1) and the Nipah virus, can all be traced back to close contact between humans and animals. Nevertheless, a coronavirus pandemic was needed before the problem was taken seriously.

There has also been a marked increase in the number of zoonotic diseases in recent years. This is largely because humans and domestic animals are encroaching on new territory, we are chopping down existing forests and fragmenting ecosystems, which means we are having more close contact with wild animals. This promotes the spread of viruses, bacteria and other pathogens to humans, either directly or via domestic animals.

> ***«We need hope for the future, backed up with action. The window to act is shrinking, while the impact on the future is worsening»***

Another reason for the increase in diseases is that reduced biodiversity seems to favour a few chosen species with a particularly high potential for the spread of infection, such as rats, bats and some primates. In particular, bat populations are reservoirs for viruses that cause Ebola, Nipah virus infection, SARS – and now COVID-19 – in humans. When their natural habitats are destroyed, they are forced to seek food where humans and livestock live. This increases the risk of infection. Population numbers and consumption are

common drivers of climate change and loss of nature. These problems require a systematic approach. The challenges must also be addressed through education (11).

Loss of hope for the future

The impact of climate change on our health not only relates to the direct and indirect ramifications of climate change itself, but also the psychological effects, such as anxiety (12). The Greta Thunberg generation is questioning whether there is a future when the outlook seems so bleak. This raises the issue of how risk should be communicated. There is no simple recipe for this, other than following the research, as summarised in the IPCC's reports. The situation is serious. The world and humanity will still exist, but undoubtedly at the growing expense of our physical and mental well-being. We need hope for the future, backed up with action. The window to act is shrinking, while the impact on the future is worsening. We need a policy with a thousand-year perspective – and a Hippocratic oath for those yet to be born.

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