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Editorial
Climate Change

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Everything keeps changing, even the climate. Scientists are not very good at explaining past climate change. They cannot fully explain the causes of the periodic ice ages that occurred over the last 2 million years and the much milder climate fluctuations that took place during the present interglacial, which started about 12,000 years ago. The causes of presently ongoing climate change, however, are easily explained: mainly, the burning of fossil fuels causing a rise in atmospheric carbon dioxide (CO_2). CO_2 is a "greenhouse gas" that raises the temperature because it allows visible light to reach Earth's surface but absorbs the infrared wavelengths that beam the absorbed energy from the sun-heated surface back into outer space.

The process raises important research questions at many levels: First, we want to project the future course of Earth's climate on a time scale of centuries. This is not mere physics, but requires an understanding of the dynamic that drives the evolution of modern industrial societies. Secondly, we need to assess the positive and negative impacts of present and projected future climate changes on humans world-wide: Who are the winners and who are the losers? Thirdly, there is the question of whether and how humans can adapt to a changing climate. Finally, we have to study how people — both ruling elites and commoners — integrate (mis)information about climate change into their worldviews.

First, the facts about ongoing climate change. An unusual world-wide warming trend beyond the small earlier changes has been documented unequivocally since the 1980s, a time when CO_2 emissions began to rise steeply because China and many other developing countries were industrializing rapidly. Industrialization is not possible without large amounts of energy to keep machines, vehicles and, more recently, information processing devices running, and fossil fuels have so far been the cheapest source of energy. Rising atmospheric CO_2 has so far raised average temperatures by about 1°C in the tropics and 3°C in the Arctic. Why this difference? Because of positive and negative feedback loops. In the tropics, warming is kept within limits by a negative feedback: Higher temperature raises evaporation, causing more clouds to form that limit further warming because they prevent direct sunlight from reaching Earth's surface. In the Arctic, by contrast, there is a positive feedback through snow cover: Snow is white, meaning it beams most of the energy brought in by the sunlight back into outer space directly as visible light, rather than indirectly as infrared radiation. Climate warming means less snow, therefore more sunlight absorbed and turned into heat by the snow-free dark surface, causing even more warming.

And what about the impact of climate change on humans? First, there is the "greening of the Earth" effect, meaning that all green plants on Earth are now growing faster than they did in the past. Crop yields are rising, although also the weeds are growing faster. Greening of the Earth is caused directly by elevated CO_2, for the simple reason that atmospheric CO_2 is a limiting substrate for photosynthesis. Human activity has raised atmospheric CO_2 by at least 50% so far, from 0.028% to 0.043%. Therefore predictably, "carbon fertilization" makes all plants grow faster (Zhu et al., 2016).

It is equally obvious that arctic regions are the biggest beneficiaries of climate change. At least, to my knowledge Putin never complained about man-made climate change making Siberia a few degrees warmer. Tropical countries need to be more concerned because a warming climate means less comfort for everyone and higher energy costs for air conditioning in the homes and offices of the rich. The effects for farmers are more ambiguous. Higher temperature means more evaporation, raising the impact of droughts especially in semi-arid and seasonally dry regions; but more evaporation also means more rainfall, which is a most welcome effect in arid regions. We know, for example, that the ice ages were dry periods in Africa during which the rainforest became fragmented (Piñeiro et al., 2021).

The atmospheric content of water vapour increases by about 7% for each 1°C rise in air temperature (Trenberth, 2011). Therefore, climate warming can worsen extremes of rainfall and make flooding more severe even in areas where the total amount of rainfall does not increase.

Importantly, people can not only benefit passively from the desirable effects of climate change, such as less ice in the Arctic Ocean and increased rainfall in arid areas. They can also adapt actively to the undesirable effects of climate change. In the worst case they have to respond effectively to climate-related disasters such as flooding, trying to limit the damage after the event. One article in this issue of *Mankind Quarterly*, by Annastarsia Taunyane and Joseph Rukema, describes how the residents of an affected urban area in South Africa responded to severe flooding that may have been aggravated by climate warming — although it would have been better to be proactive, for example by constructing better dams and drainage systems. Adaptation, especially of the proactive kind, is indeed almost always possible.

Farmers in particular need to adapt. To give one example, on the Caribbean island of Dominica, the commercial citrus varieties cannot be grown at sea level because they get affected by a deadly virus. For unknown reasons, this disease is not a big problem at higher altitudes, presumably because of the lower temperature. Applying the rule of thumb that a 100 meter gain in altitude reduces the temperature by 0.5°C, a 1°C rise in average temperature raises the altitude beyond which citrus can be grown by 200 meters. If the country had an effective agricultural extension service, extension officers would advise the farmers to grow citrus trees like oranges and grapefruits only at the highest elevations because even the mid-altitudes will soon become unsuitable for citrus cultivation. At these mid-altitudes, they should instead plant heat-loving trees such as mango, coconut and sapodilla.

Adaptation to climate change and climate extremes is the theme of an article by Nik Burhan and his co-workers in this issue of *Mankind Quarterly*. These researchers studied the roles of adaptive capacity and technology adoption for adaptation of local farmers to climate variability and climatic extremes. Their study site was the Muda River Basin in peninsular Malaysia, a rice-growing area with an average annual temperature of 26-28°C and annual rainfall between 2,160 and 3,000 mm. Unsurprisingly, episodic floods are the main climate-related challenge in this environment. The Malaysian researchers use Rational Choice Theory as their theoretical framework. This can be described as a theory of selfish individualism, as it emphasizes that humans act rationally to maximize their personal gain (Scott, 2000). Economists usually assume that financial gain and improved standard of living is what people pursue most of the time, but they also speak more generally of "utility" in order to include gains in intangible assets such as reputation, aesthetic enjoyment, self-esteem, cognitive consistency, and moral righteousness. Even economists must acknowledge the old wisdom that man does not live by bread alone (*Deuteronomy* 8:3; *Matthew* 4:4).

The assumptions behind this research in Malaysia are fundamentally different from climate change discourse in Western countries. Nothing in this rather lengthy and thorough Malaysian study suggests any "net zero" ambitions related to this research. The assumption is simply that Malaysian farmers have always faced climate-related challenges, many of these challenges are likely to become more serious, and people need to take rational action in order to adapt to them. Also, when the Malaysian researchers mention "climate anxiety", they mean something different from its meaning in the Western context. In Malaysia, it is anxiety stemming from actual experiences with flooding and other disasters. In the West, however, climate anxiety is not caused by experiences with inclement weather, but by (mis)information about the nature of climate change which is hyped as a catastrophe by the media: a truly astonishing disconnect between belief, real-life experience, and rationality. Researchers in Western countries have already created at least 12 different rating scales to diagnose climate change anxiety as a psychiatric disorder (Clayton, 2020; van Dijk et al., 2025).

Curiously, Western-style climate change hysteria and anxiety has reached epidemic proportions only in countries that actually benefit from climate change! Rational Choice Theory seems to be applicable to Malaysians but not to Westerners, but this first impression may no longer be true when we take the intangible benefits of human beliefs into account. In Western countries, belief in the catastrophic nature of climate change has become an article of faith rather than of science or personal experience (McCright & Dunlap, 2011), the apocalyptic element in a religion-like postmodern belief system that Western intellectuals have concocted after rejecting traditional religion — something that educated Malaysians have not yet done.

This is a field of research in its own right. The study of human responses to climate change, or information about climate change, is known in anthropology under the heading of "climate change reception studies" (de Wit & Haines, 2022). Properly done, it is an inquiry into the psychological processes that shape the diverse elements of religious and ideological beliefs and that link these elements into more-or-less coherent worldviews in which the material, moral and spiritual worlds are inextricably linked — although we must also study the very tangible interests of those who create and sell the narratives that people desire.

Anthropogenic climate change is self-limiting, being restricted to an intermediate stage in the evolution of industrial civilization. Exit from this stage can be in two directions: Either people become unable to maintain modern industrial civilization and regress to a pre-industrial state; or they progress to a more advanced stage by learning how to use reliable alternative energy sources such as nuclear fusion. Which one of these two possibilities will materialize depends above all on the evolution of human intelligence during the next generations and centuries. The most important lesson is this: If you want to know what the future brings, do not observe how the climate is changing. Observe instead how the people are changing.

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