

What does history teach us about Humanity's ability to adapt to climate change?

Humanity constantly repeats its mistakes. The message is clear: 'Those who cannot remember the past are condemned to repeat it' (George Santayana). Therefore, the greatest tool in our plight against climate change is the knowledge of humanity's historical ability to adapt. Through case studies, it is not only revealed how humanity has adapted to climate change, but how its success is affected. Therefore, the most important lessons history teaches us about climate change are the significance of attitudes towards adaptation, social and economic equality, and the futility of short-term adaptation. As a result, history most valuably teaches us that humanity's past ability to adapt to climate change is dictated by attitudes towards the success of adaptation, and thus we must reflect this willingness to adapt in our 21st century climate crisis.

Arguably the most important lesson history teaches us about our ability to adapt is its great dependence on our attitude towards change. From the 13th to 19th centuries, the earth experienced an extreme cooling known as the 'Little Ice Age.' This characterised a period of harvest failures, famine, social unrest and widescale death; however, in the face of one of the greatest natural adversities known to man, the Dutch Republic willingly accepted the unpreventability of climate change and adapted accordingly. Thick sea ice caused by the cooling prevented whalers from conveying blubber to their established whaling stations, on the islands of Jan Mayen and Spitsbergen, for preparation. It appeared that climate change had destroyed industry. However, instead of raising blubber oil costs, triggering an economic crisis, the whalers chose instead to develop new technology, allowing them to prepare the oil

aboard their ships. Whilst initially costly, considerable investment was needed to facilitate the new seaborne operations; the Dutch were henceforth able to produce oil of unprecedented purity, vastly elevating their position in European markets. Moreover, the Dutch federal republican government actively permitted the expiration of a corporate monopoly of whaling, thereby encouraging competition between new whalers, bolstering overall productivity - a golden age of Whaling ensued. An undeniable lesson is taught, resembling 21st century challenges, that we must sacrifice current fuel industries to allow emergence of a more competitive and productive renewable energy market. Promoting industries better adapted to the changing climate and thus with a greater chance of success (economic and social) in the new world that they reflect. Therefore, history teaches us that the progressive, forward-thinking attitudes, exemplified by the Dutch, towards climate change facilitated industrial advancements that secured long term financial and political prosperity.

A second lesson history teaches us is that the reduction of social and economic inequalities enables successful adaptation to climate change. The effects of the Little Ice Age have revealed this through the context of the 17th Century Japanese Rice Crisis. Severe cold and heavy rainfall caused Japanese grain yields in the 1630s and 1640s to fall exponentially, triggering the great famine of the Kan'ei period. Extensive starvation and death followed, exacerbated by the rapid Japanese population growth of the late 16th century. Therefore, because of the deteriorating agricultural conditions, in the late 1630s, the Shogunate was compelled to adapt by granting relief to the poor through the development of a relief administration structure. The three facets of hunger relief consisted of 'domain-sponsored

seasonal rice gruel kitchen for beggars, a town-wide collection of rice donations for townspeople and a domain-funded grain loan programme' (Maren Ehlers). As a result, the success of the Japanese Shogunate's 'benevolent rule' was founded on a ruler's desire to support all people, including the Kobyakusho (lesser peasantry). By reducing social and economic inequalities, Japan became one of the only nations able to adapt to the climate crisis. Conversely, the Chinese Ming Dynasty, faced with the same agricultural hardships, did not adapt, and thus collapsed. By the 1630s, some of China's most affluent areas were threatened by severe food shortages and outbreaks of epidemics; however, instead of imposing an effective top-down adaptation technique like the Japanese, Ming officials proved incapable of overcoming this crisis. In response to food shortages, prices inflated exponentially, exacerbating national inequalities as the elite were able to afford the food, whereas most of the population starved. Inevitably, civil unrest followed, sparking nationwide uprisings threatening the political stability of the already fractured nation – by April 1644, the Ming dynasty fell to a rebel army, succeeded by the Qing dynasty in June. History has proven that when adaptation reflects an entire population, it can succeed. Therefore, those with the power to do so must apply this to 21st century solutions, sacrificing economic competition to instead focus on reducing disparities. A united, satisfied country is more robust in the face of adversity – better suited to address climate change. History teaches us that with a universal goal, the entire population will benefit from appropriate adaptation.

A final lesson History teaches us about our ability to adapt to climate change is that when all else fails, settlements migrate. An early example of this is the previously inexplicable

desertion of Viking settlements in Greenland. In the 10th century, Vikings landed on Greenland, establishing the Eastern Julianehab settlement and a Western settlement near Gothalk and Nuuk; however, by the 1400s, these settlements were deserted. The recently unearthed explanation for this begins with records in Icelandic annals and contemporary geographical descriptions of the landscape indicating increasing amounts of sea ice off the coast of Iceland. To comprehend the severity of such a change, one must study previous Viking livelihood in Greenland. Tundra landscapes and extreme weather prevented cultivation of crops, therefore Vikings relied upon livestock and seal hunting for food and industry. However, Ice cores and historical records of sea ice have revealed particularly cold years from 1308-1318, 1324-1329, 1343-1362 and 1380-1384; in which cold summers led to reduced hay production, insufficient to sustain the livestock, whilst cold winters saw sea ice blocking access to sealing grounds. The Vikings found themselves short of food indefinitely. Whilst the continuous cold climate made life increasingly impossible in Greenland, the turning point occurred in the 1380s when archaeozoological evidence revealed a crisis in late spring whereby temperatures fell such that livestock couldn't survive. Subsequent starvation was so severe that Vikings were forced to eat their own hunting dogs, leaving clear marks of butchery on the dog's remains discovered by 21st century archaeologists. Furthermore, this economic catastrophe wasn't contained to home industry: European markets soon looked elsewhere, leaving Greenland with no hope of recovery. Subsequently, historians have concluded that the scarcity of artifacts left in Greenland implied that, by 1408, the Vikings had fled in search of more promising locations, namely Vinland (Newfoundland) and its forests. Over 500 years later, following the 1930s US Dust Bowl, 2.5 million people migrated from the barren Plains states, 200,000 of which landed in California. Consequently, not only has history taught us that humanity adapts to climate change by fleeing worst affected areas,

but that we fail to adapt in the long term. The Vikings were met with conflict from Native Americans in Vinland and eventually their new settlement too collapsed. Not only does this preach the futility of short-term adaptation without future considerations, but also a history of intolerance of immigrants leading to societal demise. Therefore, we must reconsider 21st century approaches to immigration, rejecting nationalist and xenophobic attitudes. The importance of learning from past mistakes is also evidenced by the 2015 Californian climate crisis whereby the droughts of the 1930s were repeated. History hereby concludes that humanity's adaptation is condemned to fail if we continue initial migration. We must develop the long-term solutions to climate change that our ancestors neglected. Therefore, this is an important lesson taught by history, especially prudent considering we have exhausted all migration opportunities.

Therefore, the most valuable lesson learned about humanity's past ability to adapt to climate change is the influence of attitudes towards the success of adaptation. If we choose to view climate change as a necessary evil, a catalyst for technological advancements like the Dutch, we can adapt successfully to suit the changing world we live in; whereas if we continue to repeat the failures of the Easter Islanders, ignoring the undeniable incompatibility of our livelihoods with a changing reality, then we as a society condemn ourselves to eventual demise. Furthermore, the social advancements of the Japanese proves that humans can not only adapt to climate change, but also illicit social reform when willing. Those who fight this, just like the Ming Dynasty, protest in vain. Finally, history also forces us to learn that the severity of the self-imposed climate crisis of the 21st century is unprecedented and therefore we must progress from our history of migration to develop permanent adaptation methods.

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Overall, a willingness to reform all areas of society is the determining factor of our success.

Therefore, the greatest lesson history reveals about our adaptation is that to make significant, effective progress in our plight against climate change, entire populations must be considered.