



Review Paper

Reconceptualising the Anthropocene: Climate change and Gendered Vulnerabilities

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Abstract

The veracity of climate change stands irrefutable. Accelerated by the Anthropocene, climate change is premised on the dissolution of the age old dichotomy between Man and Nature. Paul J. Crutzen the Dutch atmospheric chemist and Nobel Prize winner argued that the genesis of the Anthropocene epoch could be traced from the latter part of the eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane. This period also happened to coincide with James Watt's design of the steam engine in 1784. Indeed, human activities of mining, construction and deforestation have come to surpass the effects of non-human forces. The power of humans have conquered over that of nature in determining life on Earth. However, it is equally essential to hold cognizance of the fact that climate change, as a consequence of the Anthropocene epoch, projected as a homogenous act of humankind is not devoid of complexities as culpabilities cannot be straight jacketed into uniform categories. A desk review of the existing literature aids the readers to garner a more holistic understanding into the causalities of climate change from a gendered perspective and how incorporating a gender conscious approach can in turn be beneficial in effective climate change mitigation and adaptation.

Keywords: Industrialization, anthropocene, climate change, gender, women, vulnerabilities, COP 26, policy legislation.

Introduction

Humanity treads on the path of extinction since it heralded the Anthropocene Epoch. Etymological definitional endeavors describe the Anthropocene as derived from the Greek words *Anthropos* meaning "Man" and *Cene* meaning "New/ Recent". Popularized by Biologist Eugene Storer and Chemist Paul Crutzen in 2000, the Anthropocene as a geological unit of time operates unofficially, nourished by the Holocene¹.

The Holocene (Recent Whole) as a geological unit of time is descriptive of the post glacial geological epoch of the past 10,000-12,000 years, agreed upon by the International Geological Congress in Bologna, 1885. The term was first proposed by Sir Charles Lyell in 1833, and contributed to by G. P Marsh who had already published a book namely "Man and Nature" (1864), followed by Stoppani, who in 1873 rated mankind's activities as *a new telluric force which in power and universality may be compared to the greater forces on Earth*². The Anthropocene epoch tends to mark a significant departure from its predecessor the Holocene, as its magnitude, variety, longevity including land surface transformation is indicative of the fact that the footprint of human activity overshadows the Earth system, fundamentally causally responsible for contemporary environmental change, impacts of which would be visible in the geological stratigraphic.

The Holocenic period, underlined by the onset of acceleration in industrialization, familiarizes the readers with the fact that mankind's activities have incessantly grown into an ineluctable, significant geological and morphological force. Alternatively French Jesuit priest P. Teilhard de Chardin and E. Le Roy in 1924 coined the term *Noosphere* as embodying the world of thought and knowledge driven by humankind's brainpower and technological talents, shaping its own future and that of the environment². It was during the Holocene that this postulation gained momentum.

Following this was the recent induction of the term *Anthropocene* descriptive of the current geological epoch to assertively emphasize on the central role of humankind acting as the wheel of transformation in the domain of geology and ecology. In 2009, the Anthropocene Working Group of the Sub commission on Quaternary Stratigraphy (AWG) was established to debate the scientific acceptance of the term. In 2016, the AWG proposed that the Anthropocene is a geologically *real* epoch, thereby bringing an end to the Holocene which began around 11,700 years ago at the end of the last glacial period³.

The essence of the Anthropocene conceptualization lies in the belief that human activities of mining, construction and deforestation have come to surpass the effects of non-human forces, leaving marks as vast and discernible as those produced by geological processes of erosion and eruption⁴.

Thus, the power of humans have conquered over that of nature in determining life on Earth. Notwithstanding, before understanding the complexities of the Anthropocene, it becomes essential that we make inquiries into the trajectory that has culminated into the present epoch of Anthropocene and how it's skewed comprehension contradicts the efforts made in managing the human footprint. This can be done by having a historical understanding of the Pre Anthropocene events as introduced by Will Steffen, Paul J Crutzen and John R. Mc Neill (2007).

Pre-Anthropocene Events

Narratives that dominate the pre-Anthropocene epistemology launch into the assumptions of hunting gathering and the pre agricultural humans as presumed to be living in a state of complete harmony with the nature and environment. Recent research however counters this belief as they have evidenced the predation and modification of landscapes mostly through the use of Fire by humans⁵. While the human impacts vis a vis fire were inevitable, they certainly were largely local. Thus, human capacity was devoid of the technological and organizational capability to match, let alone dominate the great forces of nature.

Owing to its local build out, the next candidate marking the earliest impact of humans on Earth's biota, after the use of Fire was the Mega fauna Extinction dating 50,000 to 10,000 years ago marked by loss of about half of all large bodied mammals , worldwide, accounting for 4 per cent of all mammal species⁶.

Subsequent evidence of human impact on fauna has can be found in the processes of domestication of animals and that of plants, giving way to agricultural practices. Agriculture operated on replacing natural vegetation thereby increasing species extinction rates, altering biogeochemical cycles⁶. A compelling hypothesis suggests that the early agricultural development during the mid-Holocene sanctioned clearing of forests and irrigation of rice which led to an increase in the atmospheric carbon dioxide. However spatial and temporal variations in atmospheric CO₂ during this period contributes to the contentious origins of the Anthropocene.

Pre-industrial human activities did impact the environment in multifarious ways largely based on knowledge derived from trial - error and observation, modifying the tasks of hunting, gathering and farming. However, the humans did not have the numbers or socio-economic organisation or the technologies required to equal, if not dominate the forces of nature. Thereby human impacts remained local and mostly transitory, within the limits and bounds of natural variability of environment⁵. Nevertheless, the activities did provide a pretext to development of future human enterprise, setting the stage of the Anthropocene.

The Anthropocene: The Anthropocene developed in the backdrop of the Holocene. While the origins of the

Anthropocene constitute a separate debate in itself, it's build out can be best explained in the following stages:

Stage 1- The Industrial Era (1800-1945): Industrialization marked an important point of transition in human history. Conditioned by Enlightenment and the quest for reason, giving way to scientific revolution, industrialization was causally embedded in the material factors such as shortage of wood and abundant water, power and coal in England as well as the other socio-political structures that rewarded risk taking and innovation.

This was conducive to an increased coal use, initially having little impact on global atmospheric CO₂ but followed by a relatively smooth increase subsequently. Complementary was the enormous expansion of use in other fossil fuels (oil and gas). Fossil fuels provided an efficient source of trapped energy owing to carbon storage from a million years of photosynthesis. As explained by Will Steffen, Paul J. Crutzen and John McNeill (2007):

"Prior to the widespread use of fossil fuels, the energy harvest available to humankind was tightly constrained. Water and wind power were available only in favored locations, and only in societies where the relevant technologies of watermills, sailing ships, and windmills had been developed or imported. Muscular energy derived from animals, and through them from plants, was limited by the area of suitable land for crops and forage, in many places by shortages of water, and everywhere by inescapable biological inefficiencies: plants photosynthesize less than a percent of the solar energy that falls on the Earth, and animals eating those plants retain only a tenth of the chemical energy stored in plants. All this amounted to a bottleneck upon human numbers, the global economy, and the ability of humankind to shape the rest of the biosphere and to influence the functioning of the Earth System."

The creation of the steam engine by James Watt in 1770s and 1780s was credited with the use of fossil fuels thereby shattering the bottleneck, clearing the path for holding out looser constraints upon energy supply and an era of ever mounting influence of the human species upon the Earth system. The atmosphere sung the tales of revolutionary industrial transformation. Crutzen and others account for an increase in the CH₄ and nitrous oxide (N₂O) levels to 1250 and 288 ppbv in 1950 respectively from a mere 850 and 272 ppbv respectively⁵.

Atmospheric carbon dioxide concentration is taken as a yardstick to measure the progression of the Anthropocene, quantifying human imprint on Earth system and its natural variability. Thus, around the beginning of the Stage 1 of the Anthropocene till 1945, the CO₂ levels rose by about 25 ppm, surpassing the upper limit of variation of the Holocene, reflective of the fact that human activities were affecting the environment⁵.

Stage-2: The Great Acceleration (1945-ca. 2015): A population boom was detrimental to the period of Great Acceleration, conducive to large scale changes in natural processes. Underlining this period was development of novel materials from minerals to plastics, to persistent organic pollutants and inorganic compounds. The most visible and poignant conjuncture was the fallout from the nuclear explosion and subsequent nuclear tests contributing to increased radioactivity recorded in high resolution ice cores, lake and salt marsh sediments along with corals and tree rings⁶.

Fundamental to this period of Great acceleration was open trade and increased capital flows as championed by the United States of America. The post-World War II era was characterized by a technological revolution, representing new application of fossil fuels, unprecedented funding in innovation, recruitment and advances in the field. The context of the Great acceleration was largely based on cultural, political and legal transformations wherein the decisions taken by the world's ministries accounted very little for the growing human impacts on the Earth system, but were in fact an undeniable reality.

As Crutzen and others document, “*Nearly three quarters of the anthropogenically driven rise in CO₂ concentration has occurred since 1950 and about half of the total rise has occurred in just the last 30 years.*”

Stage-3: Modern Environmentalism (ca. 2015-?): Global Warming and climate change have become an irrefutable reality. A major societal concern since the 1960s has taken roots with the birth of modern environmentalism. Scientific researches and observations validate arguments legitimizing erosion of earth's stratospheric ozone layer owing to increased emission of Chlorofluorocarbons (CFCs). The third stage of the Anthropocene recognizes the extent of human pervasiveness into the environmental structures and functions and the Earth system as a whole.

Rapid advancements in research and innovative technological knowledge, along with revolutionary winds of the internet which takes the globe by a storm, proliferation of free and open societies, dynamism of independent media, and the growth of democratic political systems curtailing the role of the arbitrary state mechanisms, encourage civil society organisations to flourish, all of which facilitate the acknowledgement and development of a more conscious humanity⁵. A three pronged philosophical debate emerges in this context embodying the varied perspectives of dealing with contemporary global environmental change:

Business as Usual: This perspective is based on several assumptions. Firstly, that global change would not be so severe or rapid enough to cause major disruption to global economic system or to other facets of the society. It also assumes that the current market oriented economic system would be able to deal with any adaptations that are required based on the idea that

increased wealth would enable the societies to tackle local and regional pollution problems effectively.

The third assumption of this perspective proclaims that resources required to mitigate global change would be better utilized in dealing with more pressing human needs. However, human decision making and working of the economic systems may not be in tandem with transformations in the Earth System. By the time humans realise that the Business as usual approach towards environmental change would not work, the ship would have sailed into the doom of decades and even centuries of environmental change, a return from which would be undoable.

Mitigation: Yet another perspective in the third Stage of the Anthropocene recognizes change as inevitable and serious, and thereby demands proactive measures. This approach believes in strengthening the resource base of the Earth system by taking off the pressure of human activities vis a vis improved technology and management. Inclusive of the efforts are wise use of Earth's resources, control of human and domestic animal population (e.g., population control), and an overall careful use and restoration of the natural environment.

Mitigation efforts are largely aimed at reducing human modification of the earth system and allowing it to function in a pre-Anthropocene way. Crutzen and others argue that while improved technology is fundamental for mitigating global change, it is not enough on its own. What completes the process effectively is a change in the individual behavior and societal values, curtailing the speed of the Great Acceleration.

Geo Engineering: Artificially engineered options are some of the drastic measures that have dominated contemporary discourse of conservation. For example, the anthropogenic emission of aerosol particles such as smoke, sulphate and dust etc. into the atmosphere provides a net cooling effect since they enhance the backscattering of incoming solar radiation. This implies that aerosols work in opposition to the Greenhouse effect and that a cleanse up of the air pollution would lead to increased global warming.

Thus, geo-engineering options have emerged which operate by purposeful manipulation of Earth system processes by humans with the intention of counteracting the anthropogenically driven environmental change such as global warming. Geo Sequestration has emerged one of the methods which involve sequestration of CO₂ in underground reservoirs thereby not only alleviating the human pressures but also reducing the acidification of ocean surface waters. Humans will in the future live up to their contribution of adding up of powerful greenhouse gases to prevent global warming and in this context geo-engineering emerge to be a technologically efficient option. However geo-engineering raises severe ethical questions, highlighting the unintended and unpredictable side effects, wielding severe consequences, worse than the issue in the first place.

Crutzen et al.⁵ contend that the Great Acceleration is reaching its criticality as the dangers of continued population growth, excessive resource use and environmental deterioration loom large. The present only waits for a tipping point in the evolution of the Anthropocene. Thus, it can be clearly understood that the humans are now overwhelming the great forces of nature. Nevertheless, the Anthropogenic viewpoint has been critically analyzed by several scholars who question the power politics implicit in defining the Anthropocene.

The Criticisms: While the enlightenment distinction between the Nature and Society has been presumed to become obsolete given that humans have become a geological force, critiques argue that a growing acknowledgement of impact of societal forces on the biosphere are couched in terms of a narrative that is completely dominated by natural science. The discourse on Anthropocene conceptualization provides that the Industrial Revolution marked the onset of human modification of the Earth System primarily in the form of climate change, symbolized by the steam engine of James Watt, an artifact that unlocked the potentials of fossil energy, catapulting the human species into full spectrum dominance. However, theorists rarely look at the underlying causes of the rise of the steam⁷.

A detailed analysis into the causality provides that transition to fossil fuel energy in Britain was largely determined by highly inequitable global processes from its very genesis. The very rationale for investing in steam technology was motivated by the opportunities provided by a depopulated New World, Afro-American slavery, exploitation of British labour in factories and mines and a widespread demand for inexpensive cotton cloth. Additionally steam engine technology could not be acquired by everyone. Rather it was adopted and installed only by the owners of the means of production who saw steam power as a weapon.

Technically, the succession in fossil fuel energy technologies following steam – that of electricity, internal combustion engine, petroleum complex etc. all are products of investment decisions underscored by critical inputs of the governments, but never a product of democratic deliberation. Interestingly, the advanced capitalist countries of the north composed 18.8 per cent of the world population but were responsible for 72.7 per cent of CO₂ emitted since 1850⁷.

What shines out is that uneven distribution is the very condition for the existence of modern fossil fuel technology⁷. The affluence of high tech modernity cannot possibly be universalized. The density of distribution of technologies that are ultimately dependent upon fossil fuels largely coincides with purchasing power. Thus, perceptions of technology are cultural constructions conditioned by global power structures. A significant stratum of humanity does not have access to the fossil economy, relying largely on charcoal, firewood, organic waste etc. for domestic purposes. It is therefore questionable how they contribute to the swelling emission of Greenhouse

Gasses (GHGs), conducive to global warming and climate change.

Who constitutes the Anthropocene is an indispensable question that emerges therefore. Blaming the entire humanity for the burden appears to be an exaggerated abstraction. A crucial intervention therefore is emblematic of the fact that climate change is mostly *sociogenic* meaning that the driving forces are derived from a specific social structure, rather being a species wide trait. One can therefore argue that in climate change, it is the social relations that determine natural conditions⁷.

In the apocalyptic repercussions of climate change, the poor will be the first to feel the reverberations. The impact of climate change is not universal but is uneven and combined. It is in this context that the matrix of climate change becomes a crucial domain of investigation.

Feminist Critique of the Anthropocene

The sciences concur that something has materially changed in the geological record but rarely this categorization has been apolitical, ahistorical or value neutral. Sandra Harding as stated in Walton (2020) questioned the neutrality of masculinist traditions of scientific knowledge and the patriarchal assumptions that underpin the same. The changing (s)cene is not a bland empirical geological fact, rather it is a political provocation detrimental of culpability.

The human history narrative constructions are not for or about everyone. It reflects a universalized masculine position situated condescendingly in the Global North, thriving on conditions of middle class affluence and capitalist consumption. Undoubtedly the Anthropocene presents a false universal of an ahistoric construction of the species *Man* (equating it to Human) laying blame equally and universally across all economic and agricultural systems and cultures thereby erasing the specificity of historical relations and consequences³.

Clair Colebrook as stated by Grusin, in her essay contends that: “*We have always argued that a dream of a good Anthropocene through geoengineering, a pure ecology in which everything serves to maximize everything else and in which there is no cost, could be only by way of countless injustices including prominently those against women*”⁴.

In 2017, for example, a wide ranging study analyzing the environmental impact of a range of individual lifestyle choices in developed countries, arrived at a conclusion of four actions that were most effective in limiting personal greenhouse gas emissions one of which included having fewer children. However, policies to control populations are a façade wherein personal autonomy of women seems to be sacrificed in the name of the planet³. This stance is theoretically justified by the arguments proposed by the Ecological Modernization Approach and the Environmental Security Approach⁸.

Ecological Modernisation Approach

This approach upholds that the issue of climate change requires a technological and scientific fixation. It banks on technocratic environmental governance found atoned on scientific methodologies that are objective, neutral and value free. The approach advocates for nurturing partnership among market, science and government. This is largely premised on the belief that both environmental protection and economic prosperity can be achieved together. Thus, it has capitalized the concern for protecting the environment and has introduced specialized solution such as carbon sequestration, renewable energy, genetically modified crops, geo engineering etc. However, this approach is tethered to masculinity pegs for it ignores the concerns for equity and justice.

Environmental Security Approach

Operating on the assumptions of a Hobbes an model of existence as appropriated by Garrett Hardin in her work the Tragedy of the Commons which stimulates the possibilities of clashes between groups within and outside the society, undermining the stability of the state, this approach was best practiced by the defense ministries (essentially dominated by men) since the 1990s have interpreted environmental insecurities in ways that called for armed and militaristic readiness, alliances and responses. In the process it fails to understand the impact on people during such resource based wars. What it defines and understands as security is severely narrow for it leaves the imperatives components of insecurity as unexplored. This is particularly crucial in terms of the gendered consequences.

The gendered vulnerabilities in the Anthropocene conceptualizations provide the philosophical base to the policies that are formulated with respect to climate change which tend to reinforce the masculinist biases. An enquiry into the variable consequential outcomes of climate change provides the readers with aholistic view of the ground level reality of policy formulation and implementation that remains largely skewed to forward the interest of a select few, inherently contradicting the Anthropocene logic of homogeneity.

Engendered Outcomes

The contemporary economies and development discourses project the impact of climate change caused by storms, floods and droughts which are inherently skewed given that they affect different people differently. At the very outset studies show that women are amongst the primary recipients of the negative impact of climate change and disasters. An equal, if not lesser, burden is posed upon the rural women who have access to restricted resources, limited rights, are overpowered by a widespread patriarchal structure, have restricted mobility and a muted voice in decision making. Women belonging to the marginalized sections are further doubly burdened, given the

location of their identity in the social spectrum. Thus, a Dalit women's position becomes extremely contentious and the policies formulated thereof rarely reflect their concerns⁸.

Not only women's concerns are omitted from the prominent environmental deals, adaptation and mitigation efforts sanctioned by the same approach the issue from a gender neutral perspective. Climate change policies are marred by a process of masculinization. Indeed, mainstream policy formulation is 'Malestream'.

The International Panel on Climate Change Report of 2001 categorically highlighted that those who are the most vulnerable and marginalised will bear the maximum impact of climate change. The poor, primarily in developing countries are expected to be disproportionately affected and consequently in greatest need of adaptation strategies in the face of climate change and variability.

The position of women in this case becomes increasingly contentious, as across societies the impact of climate change has affected men and women differently. The responsibility of gathering and producing food, collecting water, sourcing fuel for heating and cooking is often placed upon women. With the advent of climate change, these tasks have become increasingly difficult. *'Extreme weather such as droughts and floods have greater impact upon the poor and most vulnerable and 70 per cent of the world's poor are women'*⁹.

The United Nations Conference on Disaster raised the issues of gender in climate change and adaptation and produced the Hyogo framework which recommended that all disaster management policies, planning and decision-making processes, including those related to risk assessment; early warning, information management; education and training should also be assessed in terms of a gender perspective. This nourished the idea that gender and human security issues should find a place in the development policies and programmes of different governments on climate change⁸.

Cynthia Enloe, a prominent standpoint feminist highlighted the overpowering tendency of the state over women institutions to maintain masculinity in work and governance⁸. In the context of climate change, the gender vulnerabilities become starkly clear as droughts or floods cause due to climate change can give further impetus to difficulties in sanitation, health, continuation of paid labour and education, thereby curtailing freedom and is therefore counterproductive to development as was visualised by Nobel Laureate Amartya Sen in 1999.

The 26th UN Climate Change Conference of Parties (COP26) in Glasgow presents an exemplificatory picture of a gendered exclusion which observed a visible lack of women's leadership in climate negotiations. The wider composition of the UK COP26 team does feature women's participation as 45 per cent but their positions are circumscribed by mere advisory roles

which reflects the wide systemic issues in climate change negotiations. COP focuses on latest climate science such as securing global net zero and keep 1.5 degrees within reach. A quest for tapping on renewable energy has gained prominence¹⁰.

However even if modern energy services are made available, the gender inequality in access to productive assets, labour saving technology and affordable credit is severely limited by the cultural factors that entrench women's gender roles and constrain women's mobility outside their houses. While the knowledge of this is widely available, it is rarely staged on international platforms. Decision making is still carried out by men.

Conclusion

Thus, the Anthropocene as a homogenous geological time sanctioning climate change is a contentious proposition. It was driven by the selfish interests of the select few, the repercussions of which are faced by the masses at large, disproportionately nonetheless. Neither does it include the entire humankind nor does it affect the entire humankind equally. Even the mitigation and adaptation efforts are not inclusive as they are systematically ignorant of women's participation.

Climate action needs to transcend its scientific reductionism and mere tokenism by involving women as key negotiators and team leaders. A focus on the gendered vulnerabilities does not mean that women should be seen as the problem; rather they should be seen as the key to the solution. Focusing solely on vulnerabilities is a vexing submission. Women possess untapped skills, coping strategies and knowledge that could be used to minimize the impact of the crisis', environmental change, and disasters⁸. However scant regard has been rendered by policymakers to their concerns which accounts for the masculinisation within the rhetoric of policy making.

A comprehensive and holistic appeal towards climate change is the need of the hour. Incognisance of a gendered understanding is nothing but a humble apologia to patriarchal norms that

venerates masculinity, diagnostic of an acute myopia. A proactive and efficient cure can be found by adopting a feminist lens.

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