CLIMATE CHANGE CONCERNS AND MITIGATION MEASURES

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ABSTRACT

The hazards caused by climate change are almost as fatal as those caused by nuclear weapons. Scientific studies have shown that global warming of 1.1 degrees Celsius has resulted from anthropogenic activities. Thriving urbanization and change in the climate are both creating difficult risks, especially for cities which are poorly planned and have high levels of poor and unemployed, and lack of basic amenities. This paper examines the issue of climate change, its impact on the environment, questions that are usually posed by individuals on climate change, but most especially the actions that can be taken to mitigate its effects. The paper then emphasizes the need for people at all levels to adequately take every little action. Climate action – green buildings, reliable supplies of clean water and renewable energy, and sustainable transport systems that connect urban and rural areas can all lead to a more inclusive," fairer society."

Keyword: *Climate action, climate change, renewable energy, anthropogenic activities, urbanization*

1. INTRODUCTION

Would you willfully confine yourself in a chamber that has no openings, in which combustion takes place and CO_2 and other greenhouse gases are encased? Your answer would definitely be an emphatic "NO". Yet that is what the Earth's atmosphere has become, where detrimental gases have no means of escape. Climate change is a long term change in the average weather patterns that have come to define Earth's local, regional and global climates. Human activities and Natural events are reckoned to be contributing to an increase in average global temperatures. Tenacious flooding and droughts, persistent rains that fall out of season and dry spells have all destabilized growing seasons. Many African countries are dependent on rain for agriculture and so would be gravely affected negatively. The world at large is sitting on a keg of gun powder with lakes drying up, ice caps melting, snows disappearing and a reduction in river flow in arid and semi-arid regions. The results are grave consequences like health hazards, e.g. water-borne diseases [1]; and negative impacts on world economy [2]. Mitigation are prolonged plans and actions to minimize emissions and enhance human capability to address gas concentrations in the atmosphere [3]. Climate change mitigation appear to be the sole cause of action to tackle climate change in the 21st century [4]. [5] attested that climate change mitigation skills offer a state-of-the art remedy to the exhaust issues. Mitigation strategies contribute directly to reducing the sources of risks because they are related to the cause; on the other hand, adaptation strategies contribute to reducing the effect of risks since they are related to it.

2. WHAT IS CLIMATE?

The weather conditions prevailing in a particular area in general over a long period is called it's climate. Climate is the long-term pattern of weather in a particular area. Weather can vary from hour to hour, daily, monthly or even yearly. A region's weather patterns, usually tracked for at least 30 years are considered its climate.

2.1 WHAT IS CLIMATE CHANGE?

Climate change can be defined as an increase in average global temperatures [6]. Climate change in other words are long-term shifts in temperature and weather patterns [2]. Over the last ten years, the world was averagely around 1.2^{o}C warmer than during the late 19th Century [2].

2.2 WHY IS CLIMATE CHANGE HAPPENING?

By indulging in increased economic activities for hundreds of years, humans act as significant drivers of climate change; this has boosted harmful emissions and poisonous radiation which gathers up in the atmosphere and has severe health impacts as it raises global temperature [7]. The bulk of climatic disaster are the results of intensive economic activities by humans [7 and 8]. Increase in average global temperatures is believed to be a contribution of natural events and human activities, majorly caused by increases in greenhouse gases like Carbon Dioxide (CO_2). [6]. Global warming of 1.1degree Celsius have resulted from anthropogenic activities as shown by scientific evidence.

2.3 WHY DOES IT MATTER?

Climate change endangers municipal health, whether that refers to the human or environmental aspects of municipal life [9]. According to [10], climate change cripples ecological structures, societies, and economies globally. [11] and [12] argued that not only the environment or people but economic growth of a country is gravely affected by any change in climate, as massive economic costs are linked with increasing temperatures and risen weather events like droughts and hurricanes. Climate change is certainly causing multiple health issues for people [13].

2.4 WHAT IS THE EVIDENCE FOR CLIMATE CHANGE?

Anthropogenic outcomes caused by human activity are seen in rising sea levels, severe drought, disastrous storms, water scarcity, flooding, lessening biodiversity, melting polar ice caps and severe wildfires; all of which are the major out-turn of climate change [14] Air-borne and Zoonotic diseases have become increasingly widespread on Earth [2]. There is a rise in global temperature levels [2].

2.5 HOW DO WE KNOW HUMANS ARE CAUSING CLIMATE CHANGE?

When fossil fuels burn, greenhouse gases - mostly carbon dioxide (CO_2) are released by the action [15]. The release of greenhouse gases in turn entraps surplus energy near the Earth's surface, in the atmosphere, resulting in the planet heating up [7]. Ever since the Industrial Revolution began - after humans began burning large quantities of fossil fuels - the aggregate CO_2 in the atmosphere has leap up by like 50% [16 and 17]. The recent report of [17] suggested that global temperature rises due to CO_2 emissions. There is a unique chemical fingerprint of the CO_2 unleashed from burning fossil fuel that matches the kind constantly found in the atmosphere [17].

3. WHAT ARE GOVERNMENTS DOING ABOUT CLIMATE CHANGE?

There is a landmark agreement signed in Paris in 2015 [18], where about 200 countries undertook to do their best to keep global warming to 1.5ºC.
In order to accomplish this, "net zero" CO_2 emissions has to be attained by 2050 [19 and 20] Net zero connotes bringing down greenhouse gas emissions to the fullest extent, and eliminating all residue emissions from the atmosphere.
The majority of countries have, or are taking into consideration, net zero targets, e.g. Scotland (Climate Change (Emissions Reduction Targets) [21].
Nonetheless, greenhouse gas proportions are still ascending rapidly and this is "likely" to warm up the world beyond 1.5ºC, the IPCC argues [22].

3.1 MITIGATION

Mitigation refers to International response to climatic threats, this encompasses initiatives, activities and interventions by international bodies to reduce the degradation of climate systems [23]. The report "Mitigation for Climate Change" [23] stated that transferring mitigation technologies to developed country parties is crucial to make it accessible across nation/s to combat climate change effectively. The term mitigation refers to reduction of emissions, through the use of plans and actions that span over a long period of time and enlarge human efficiency to confront gas concentrations in the atmosphere [24].

3.2 WHAT INDIVIDUALS CAN DO ABOUT CLIMATE CHANGE

Although individuals can help, unlike government and businesses, theirs are not the major changes: The European Commission's communication specified that people must accept their distinctive responsibility in adaptation and mitigation activities. [25] Here are a few ways individuals can help:

- Reduce the number of flights they take
- reduce energy use
- Improve energy efficiency and home insulation
- change to electric vehicles or avoid car use
- use electric systems like heat pumps instead of gas central heating
- reduce red meat intake

4.0 IMPACTS OF CLIMATE CHANGE

[26] in their study stated that, not attaining zero carbon emissions by 2030 will imply that climate damages caused by global heating will continue escalating for as long as emissions continue. These encompasses but not limited to droughts, the melting of polar ice-caps, wildfires, coral reef deterioration, allergies caused by pollen, inflation in food prices, deforestation, rising sea levels, melting of mountain glaciers, and migration of animals.

4.1 IMPACTS ON HEALTH

Climate change might be held accountable for additional 250,000 deaths per annum between 2030–2050 according to WHO [27]. Extreme weather-induced mortality and morbidity and the global expansion of vector-borne diseases are directly linked to these deaths [28].

Respiratory diseases have increased significantly due to climate change owing to increase in air pollution [29]. [29] further highlighted in their study that an increase in average temperature can directly influence the respiratory tract. Increase in air pollution which leads to distribution of airborne allergies can also result from natural disasters like wildfires, landslides and tornadoes [30].

In relation to vector borne diseases, global rising temperature is a major reason of extinction of many diseases. At the same time, this warming temperature might benefit the booming of some novel organisms. [31]. A current example in the Republic of China, is the outbreak of coronavirus (COVID19) resulting in pneumonia and serious respiratory complications [32, 33].

A wide-ranging family of viruses is borne in many animals, snakes and bats in particular which later transfers into humans. Therefore, it is worthy of note that the lively-hood of many vectors associated with the spreading of numerous diseases is effected by Climate change [34, 35].

Malaria, dengue fever and Lyme diseases are examples of diseases which are carried by insects and are also influenced by varying temperatures since the insects are able to procreate in places where they were previously unable to [36]. Stagnant water pools abandoned by cyclones and floods become multiplying grounds for ticks and mosquitoes, which are present in many northern countries that used to be too cold for their breeding [36].

Children can contact severe bouts of diarrheal disease, incapacitated by serious and ongoing under-nutrition, and illnesses resulting from lack of access to safe water and sanitation, polluted air and worsening environments, many children's learning and development is impaired in these conditions. And they are therefore less likely to go to school [17].

4.2 IMPACTS ON THE ENVIRONMENT

4.2.1 FOREST:

Interference in forest ecology exerts influence on the micro and macro-climates; Largely because Forests are the global measures of the world's climate [37] and play a vital part in balancing global carbon and nitrogen cycles [38, 39]. Climate change leads to particular changes in the structure and functions of ecosystems [40]. So many devastating outcomes like droughts, forest fires and pest outbreaks also result from climate change [41].

4.2.2 FOREST-DEPENDENT COMMUNITIES:

About 1.2 billion communities rely on Agro-forest while 60 million indigenous people totally depend on forests and their products for life sustenance [42].

4.3 IMPACTS ON THE WORLD ECONOMY.

The role played by climate in overall productivity and economic growth is quite a major one. Climate change has become a major worry of local as well as international policy makers [43, 44]; mainly because of its increasingly global existence and its consequence on economic growth. Global economy has suffered great losses from natural disasters connected to climate. The global economy can be affected when climate impacts strike systems in countries, spilling across borders [2]. Many researchers have propounded that global climate change will affect the agricultural sector in various world regions [32].

According to [31], a number of natural disasters has locally affected crop production in countries concerned; These impacts have been poorly controlled by populations and development of the economies which may later affect human life [32]. An example in the company of the world's most impacted countries is China, because it is vulnerable to natural disasters as a result of its large population and harsh environmental condition. The January

2016 statistical survey pointed out that China experienced an economic loss of 298.3 billion Yuan and her people, about 137 million, were gravely distressed by numerous natural disasters [45].

5.0 TAKING RESPONSIBILITY ON CLIMATE CHANGE NOW

Each country's National government has a singular responsibility to lead resolute action. This however does not rule out the fact that each region, city, and even village must play a basic role. It is at the local, regional, and urban level that the closest collaborations between citizens and rulers occur. Mitigation is international response to climatic hazards, which consists of a range of initiatives, interventions and activities by global bodies to reduce the degradation of climate systems [23].

6.0 MITIGATION MEASURES

6.1 ASSISTED MIGRATION

The well-being and efficiency of forests is tied to economic stability and growth of that area, especially in places that heavily depend on forest resources [46]. Forest ecosystems are key carbon sinks; it sequesters an approximate of 3 billion tons of carbon (C) yearly [47]. This is a major factor in mitigating the impacts of rising atmospheric CO_2 levels and climate change. [46]. Forest ecosystems constitutes 31% of the world's land mass and is source of habitat, food, and ecological services for both wildlife and humans. [46] however, observed that the fate of the forest ecosystem constitutes a great concern due to the impacts of climate change. [46] proposed Assisted migration (A.M.) which involves human mediation to assist the movement of plant species to environments with more favorable future climates, as a strategy to combat the impacts of climate change on future forests. This technique seeks to support forest productivity and add to climate change mitigation, by ensuring that forests can always fulfill ecological roles like carbon sequestration and provision of habitats for wildlife [48].

6.2 KNOWLEDGE TRANSFER

A total of 70% of the GHG emissions from Agriculture is contributed by Livestock management, especially because enteric fermentation produces considerable amounts of methane, also manure management emits both methane and N_2O [49]. Cattle production has exceptionally great possibilities for reducing its emissions being that it's the most emitting agricultural sector [50]. Despite the countless G.H.G- emission -mitigation measures that applies to cattle farming, like improvement in cattle rearing, manure application and deposition in addition to manure storage and management, they are not usually taken up by farmers even when little investment is required by them or when it even financially benefit the farms [51]. Absence of information and education is recognized as a major hurdle to the adoption of climate change mitigation measures in agriculture [52]. Due to that, better ways of sharing information and transferring knowledge can act as a key part in improving the awareness of new technologies [53]. A study according to [54] supplies proof of the effectiveness of participatory workshops for altering climate-related practice in farmers.

6.3 UTILIZATION OF BIOMASS

The utilization of Biomass is considered a feasible way to mitigate global warming, develop a sustainable economy, avoid wasting Biomass resources and increase energy supply independence [55].

6.4 COVER CROP CULTIVATION

By increasing resource efficiency within the cropping system and soil carbon stocks, cover crop cultivation can be a vital strategy for mitigating climate change in Agriculture [56]. One of such strategies is soil organic carbon (SOC) sequestration, SOC has considerable mitigation potential and is cost efficient [57, 58]. Including cover crops which is also known as intermediate or catch crops in cropping system is one way to increase SOC stocks [59, 60].

Cover crops are grown primarily to improve soil quality and reduce nutrient leaching and grown between main crops in a crop rotation, they can help control weeds and pests and have positive effects on biodiversity [61]. A scientific study stated that with early establishment of cover crops there is a resultant higher biomass yields, which leads to greater SOC sequestration potential and a larger substitution effect; therefore, the timing of cover crop establishment was shown to have a large impact on climate change mitigation potential [56].

6.5 DEMAND DRIVEN CLIMATE CHANGE MITIGATION

Construction and building materials constitute thirty-nine percent of yearly world-wide carbon dioxide (CO_2) emissions [62]. One of the largest climate change mitigation abilities appears to be in the use of wood products in construction [63]. There is therefore a strong proof of climate superiority of wood frame than in using concrete and steel frame for buildings [62]. As outlined in the new European Bauhaus initiative, the new EU forest strategy supports the fact that the most important use of wood products is to assist in turning the construction sector from a place where greenhouse gas emits into a carbon sink [64]. Built by Nature [65] is one of the numerous other national and international policy programs which promotes the use of wood in construction for climate change mitigation and restoration. Conclusively, decreasing the mean flat size would maximize not just the climate gains, but would also reduce in old forest area, and minimize both urban and forest land use when aiming for increasing the share of wood based construction [66].

6.6 HARMONIZING MANURE AND MINERAL FERTILIZERS CAN MITIGATE THE IMPACT OF CLIMATE CHANGE ON CROP YIELDS

[67] maintains that humans need 70% more food than is eaten up today because the world human population is expected to get to 9 billion by 2050. With the ongoing climate change, world agriculture has become more vulnerable [68], this in turn impacts soil organic carbon (SOC) [69] and the yield of crops [70] Improving SOC improves crop yield because SOC reflects soil quality, functions and health [71]. Globally, fertilizers are known to improve/maintain soil fertility and crop yield. Right use of fertilizers is a simple but effective way of mitigating the negative effects of climate change on production of crops [72]. The application of mineral fertilizers which has even though contributed to food supply for the growing population has been questioned, this is because of the likely serious environmental problems (like greenhouse gas emissions, environmental pollution, and soil degradation) linked to the practice [73]. Organic fertilizers are known to improve soil quality and increase crop yield [74]. But during rapid crop growth, the sluggish nutrient release from organic fertilizer might not meet the demand for available nutrients [75]. An improved fertilization strategy is the combined application of both organic and mineral fertilizers which both supplies available nutrients and gradually release macro and micro nutrients [76]. Green house and ammonia gas emissions and increase fertilizer use efficiency can be achieved by the combined application of manure and mineral fertilizers [77,78] maintained that when manure and mineral fertilizers are applied together stable and sustainable high crop yield and improved SOC under historical climate and future climate change are obtained; additionally, it helped mitigate the impact of climate change on crop yield [78]

7.0 CONCLUSION

Urgent action is needed to combat incessant risks**.** After the Paris Agreement there was a temporary drop of Emissions in 2020, largely due to Covid 19 pandemic; prior to that, it increased annually [79] Increased droughts, floods and heatwaves are already getting beyond plants' and animals' tolerance rates, leading to mass loss in species like trees and corals. [81] concluded that "if no other factors change, man's activities are increasing the average temperature by 1.1◦C per century" [80, 81] The impacts are increasingly getting difficult to manage because the weather extremes are happening simultaneously. They have led to the exposure of millions of people to serious water and food insecurity. In order to prevent continuous loss of life and other grave impacts, quick action is necessary both to adapt to climate change, and also making fast, decrease in greenhouse gas emissions [22]. Presently, progress on adaptation is irregular with increasing interludes between action taken and what is required to combat the increasing risks

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