

Q) How Technological Development leads to Climate Change and consequent change in Natural and Societal Systems? Also furnish possible adaptations options to climate change [20]

1) Introduction:

The 21<sup>st</sup> century is witnessing a swift progress and advancement in technological developments. These developments have made day to day lives easy and comfortable. However, despite their numerous benefits, these advancements are actually plaguing climate, and intern inducing a dire impact on natural and societal systems.

2) Impacts of Technological Developments on Climate Change:

As aforementioned technological developments are exacerbating climate change which then causes a plethora of ramifications. To enumerate how technology is affecting climate change is as follows:

## 2.1) Increased Energy Demand:

The Industrial revolution and the subsequent development in the domain of technology have soared energy demand. And, despite the world's endeavours to transition to renewable energy, the axiom remains that such high demand of energy cannot be, at least in the near future, met with renewable energy resources. As a corollary, Fossil fuels are used to fulfill the energy demands, which, in turn precipitate climate change.

## 2.2) Transport Emissions:

The technological developments have proliferated vehicle use amongst the populace. This, albeit has made life easy by shortening time to travel distance, but has prompted a surge in emissions of green house gases such as carbon dioxide. This eventually leads to climate change.

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### 2.3) Deforestation:

Cutting down trees for wood is an ancient practice, followed by generations. The archaic method of cutting trees down was slow and gave enough time to the ecosystem to recover. Technological developments have furnished man-kind with cutting-edge machinery that can expedite the process and cause massive deforestation.

### 2.4) Waste Generation:

Proliferation of technology have increased the consumption patterns resulting in excessive waste generation. While societies are equipped with mechanisms to manage this waste, many methods to dispose of waste, such as incineration or landfills, can generate CO<sub>2</sub> emissions which can precipitate climate change.

### 2.5) Industrial Processes:

Industrial processes harm and

aggravate climate change in many ways. One of these is the use of chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) in manufacturing many electronic applications such as refrigerators. The CFCs and HCFCs, when emitted, can have severe impacts on climate change.

### 3) Impacts of climate change on Natural and societal systems

#### 3.1) Impacts on Natural Systems:

##### 3.1.1) Rising Temperatures:

The global temperature is rising, and this can have dire impacts. This is evident from the severe heatwaves that the world is experiencing. IPCC indicates that the world temperature has risen  $1.1^{\circ}$  since 1850-1900, and is likely to increase to  $1.5^{\circ}$  in the next 20 years.

##### 3.1.2) Sea level Rise:

There is also an drastic rise in sea water levels. This is likely due to the thermal expansion of water and excessive melting of glaciers.

The IPCC observes that the sea levels are likely to rise between 0.45 feet to 3.61 feet by the end of the century.

3.1.3) Extreme Weather Conditions :

The world is witnessing severe weather conditions. Whether its heat waves or record breaking temperature drops, there is certainly some unprecedented weather changes. On top of this there has been a proliferation in natural weather related disasters such as floods etc.

3.1.4) Biodiversity loss :

The Biodiversity is also impacted due to climate change. Certain species, amphibians in particular, cannot survive in protracted and intense heat waves, as a result many different species have died or are on the

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verge of extinction.

### 3.2) Impacts on Societal Systems:

#### 3.2.1) Food Security:

Climate extremes coupled with altered precipitation have negative consequences on agricultural activities. Many crops cannot survive such conditions which eventually leads to low crop yield, inducing food shortages.

#### 3.2.2) Water Scarcity:

Protracted high temperatures can result in excessive evaporation in water bodies. This leaves only a modicum of water for drinking and other industrial and agricultural purposes.

#### 3.3.3) Infrastructure Vulnerability:

As aforementioned, climate change can proliferate natural weather related disasters such as floods, hurricanes. When infrastructure is exposed to

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such calamities, it is susceptible to heavy losses.

### 3.3.4) Health Crisis:

Extreme weather conditions coupled with natural disasters can give rise to many viruses and diseases.

#### Example:

In 2022, Pakistan was engulfed with massive floods that covered more than 1/3 of the country. This was followed by a deadly wave of viruses and diseases, such as malaria, typhoid, that gripped the country.

### 3.3.5) Economic Impact:

Severe weather conditions not only hinder crop yield but trammel many industrial process as well. This could have dire ramifications on the economic generation capacity of a region.

4) Possible Adaptations to climate change:

4.1) Stabalizing levels of Green House Gases:

Green House Gases are the paramount source of climate change, leaving severe repercussions whenever they are emitted. By tackling the power at source will ensure low levels of GHG's in atmosphere.

4.2) Transforming Energy Sector:

Burning fossil fuels for energy is another significant challenge to climate change. Since the world, coterminously, does not have the capacity to generate adequate renewable energy to supersede burning fossil fuels, they have to resort to such archaic means. However, with the passage of time, countries can amplify their renewable energy sources and end their dependency on fossil fuels.

4.3) Increase Forest Cover:

Trees have the natural ability to store CO<sub>2</sub>, the most significant

contributor to green house effect. With increasing forest cover it could be ensured that  $\text{CO}_2$  levels in the atmosphere are decreased.

44) Resilient Infrastructure:

Since natural disasters cannot be prevented from occurring, it is better to build infrastructure that can withstand such calamities. Such resilient infrastructure will minimize the damage induced.

5) Conclusion:

In a nutshell, technological advancements can precipitate climate change which in turn can have dire consequences on natural and societal systems. Albeit, technological developments cannot be halted, there are measures and policies that can be adopted to ameliorate the crisis. The solutions embodied in the answer have the potential to reduce the negative impacts of climate change.