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Q2

(9)

Industrial revolution paved the way towards socio-economic progress in the world. How do you see the far reaching environmental consequences of industrial revolution.

Industrial revolution came around mid 19th century, mainly in Britain and then socio-economic progress was seen all around the world. Industrial revolution means shifting towards machines and advanced technology for producing goods, minimizing human efforts and producing large goods in less time. The main reason of this industrial revolution was ^{invention of} oil and gas engines.

The world seen huge socio-economic progress but later on environmental calamities, such as Smog in London and other events, made the world realized that environment is being compromised and sustainable practices are needed to reduce the environmental consequences of the industrial revolution.

Socio-economic progress through industrial revolution:

Food supply to increasing population:

As the world population was increasing, more food was

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needed. To meet the growing food demand, conventional method of agriculture was becoming insufficient. Use of machines and technology in agricultural practices made the work easier for production of large amount of food in less time.

Jobs creation through Industries:

A lot of industries were being installed that created employment. Thousands of people preferred jobs in industries instead of agriculture as they were tired of feudal lord system. Industries provided them better work conditions and better salaries. Socio-economic conditions of the people improved significantly.

Better health facilities:

With advancement in technology, better health facilities was being provided to the people. Their health conditions improved.

Hence, industrial revolution came with a lot of benefits for the people, including better food, jobs and better health facilities. However, gradually the use

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oil and gas engines in industries and in transport sector shown drastic environmental calamities.

For example, London was worst hit by this industrial revolution.

Similarly, various other places shown sign of environmental degradation. Although industrial revolution paved the way for socioeconomic progress, it has far reaching environmental consequences.

~~Emission~~ ^{Burning} of fossil fuels:

Burning ~~Emission~~ of fossil fuels in industries and in vehicles, causes emission of Green House Gases (GHGs) such as oxides of carbon, sulphur and methane (CH₄). These gases are responsible for the global warming, increasing world temperature.

Acidic rain:

Rain water is slightly acidic but presence of oxides of carbon and sulphur in abundance, rain water is becoming more acidic, resulted acidic rain is dangerous for buildings, plants, soil, and for aquatic life! In return, whole food cycle disturbs.

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Smog:

Smog is combination of smoke and fog. Main reason of smog is particulate matter that becomes part of air due to industries emissions and vehicles emissions. In smog, various respiratory problems were seen in the people. It has deteriorating effects on human health, specially people with malnutrition.

Changing weather patterns:

As world temperature is rising, extreme and changing weather patterns such as long droughts or excessive rains are causing human losses, destruction of agriculture sector, and ultimately destroying economies of the vulnerable countries. For instance: Pakistan is among top five countries most vulnerable to climate change due to its geographical location. This climate change has caused droughts of 1999 and worst ever floods of 2010 and 2022 in Pakistan.

Glaciers melting and tropical cyclones:
Glaciers are melting at higher rates. For example, Pakistan

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has over 5000 glaciers which melts to give water and winter snowfall replenishes them. However, this balance is being disturbed by climate change, resulting floods.

In addition to glacial melting, tropical cyclones have become more frequent in recent years. They can bring winds at speed of 200 km/h, disturbing the weather patterns.

Critical Analysis:

Although industrial revolution has come with significant socio-economic progress, but its above-mentioned consequences have far reaching effects. Number of fatalities due to climate change is increasing across the world.

Numerous health problems are arising due to bad air quality. People's health is at risk. In addition to people's health, economies are being destroyed due to droughts and floods. Agricultural economies are at worst hit.

Floods destroy crops and water scarcity due to droughts is hampering the crops production. Moreover, rapid urbanization is also linked with

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industrial revolution. This is causing congestion in urban areas and more natural resources being destroyed such as deforestation.

Solution:

To mitigate the effects of environmental degradation, it is necessary to formulate and implementation of strict laws for shifting towards green technologies. That are less harmful to the environment.

Fossil fuel burning should be strictly reduced gradually by introducing electric vehicles and by installing filters in industries to reduce pollution through industries emission. Introduction of sustainable practices must be ensured.

Shifting towards renewable energy is inevitable. This all can only be possible by collective efforts. and only in this way, world can reduce the far reaching environmental consequences due to Industrial revolution.

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(b)

Pakistan is witnessing bad air quality index in the major cities. Discuss the underlying factors and propose way-outs.

The underlying factors of bad air quality index in the major cities of Pakistan are: Industrial emissions, burning of fossil fuels in vehicles, poor agricultural practices, and emissions from bricks kiln.

Industrial Emissions:

In major cities of Pakistan, the number of industries is significant. These industries burn fossil fuels. Burning of fossil fuels releases Green House Gases (GHGs). These GHGs are the main reason of bad air quality index.

Emissions through Vehicles:

Number of vehicles is increasing day-by-day due to increasing population of Pakistan and absence of better local transports. The railway system of Pakistan is in poor conditions.

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In addition to railway system, buses condition is also not very good. These causes increase use of private vehicles. Vehicles emit Green House Gases and contribute to bad air quality index.

Poor Agricultural Practices:

Despite severe warnings from the government, farmers ~~are~~ continued their poor agricultural practices. Burning of crops, cause significant air pollution.

Bricks Kiln:

lastly, bricks kiln also contribute to air pollution and contribute towards bad air quality.

Way-Outs:

Following is the solution to improve the air quality index of Pakistan:

(i)

Incorporation of green-technologies in industries. Government of Pakistan should provide support and subsidies to industries to install green-technologies that are environment friendly.

(ii) Installing filters in industries: Filters

pollution through bricks kiln can

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must be install in industries to filter the pollutants before releasing in air.

(iii)
Relocating Industries: Industries must be relocated away from urban centres. In this way, air quality index will be improved.

(iv)
Use of Euro-V fuel in vehicles: In vehicles high-quality fuel must be used such as Euro-V that emit less pollutants.

(v)
Incorporation of electric vehicles: Government introduction of electric buses by 2025 is a good step but faster implementation of the idea is required.

(vi)
Promotion of public transport: Government should work to promote public transport by providing better public transport facilities and by increasing tax on purchase and use of private vehicles.

(vii)
Awareness in farmers: Farmers should be aware ~~educated~~ and warned about poor agricultural practices.

(viii)
Installation of zig-zag technology in bricks kiln: installation of zig-zag technology in bricks kiln can reduce pollution through bricks kiln.

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(ix)
Strict surveillance of industries:
Regular checking of industries
to ensure environment-friendly
practices is necessary.

(x)
Awareness campaigns: Awareness campaigns
through social media platforms
is necessary so that public can
cooperate with government and
help to bring air quality index
to the better position.

Q.3

1

a) What is climate? Enlist the weather
variables and the LA-NINA and
EL NINO process in the context
of global climate distribution.

Climate: Climate is defined as the long
term prediction of weather variables
of a region or place. It is nearly
average of weather conditions of 20-30
years (2 or 3 decades).

i) Weather variables: Following is the list
of weather variables:

ii) Temperature: It is measure of hotness or
coldness of atmosphere.

iii) Precipitation: It is water falling
to ground in any form such as rain,

iv- Snow, hail
Humidity:
v- Vapours in
wind: It
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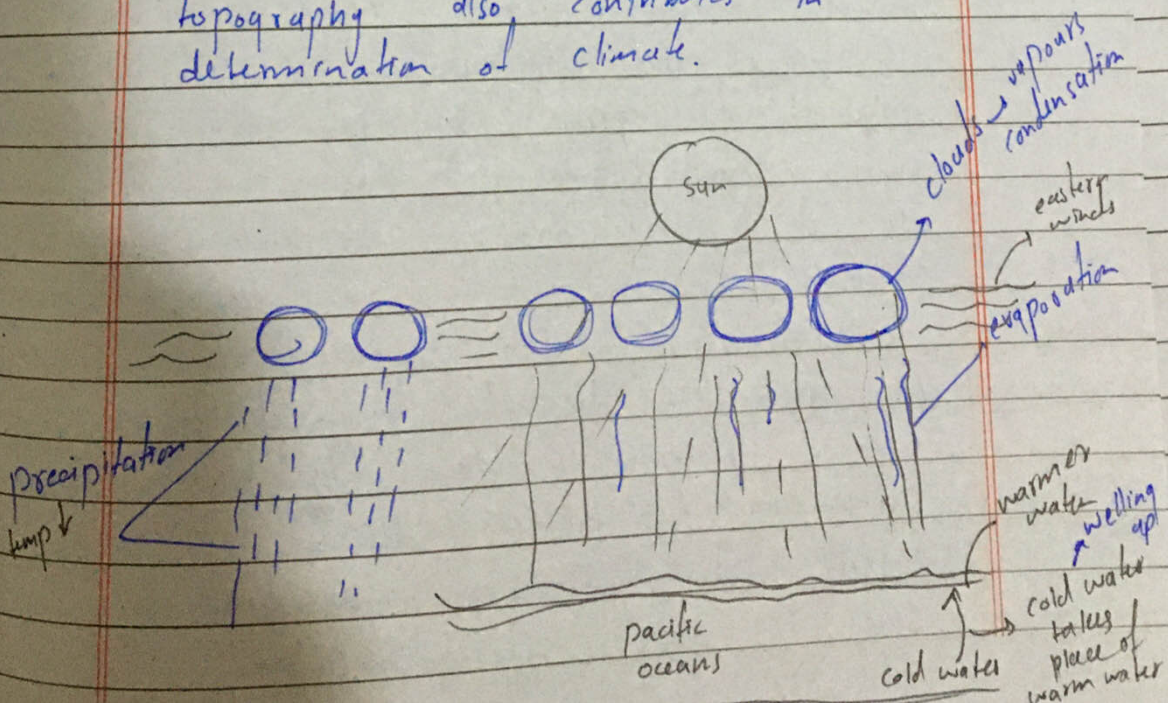
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- Snow, hail etc
- Humidity: It is measure of water vapours in air.
- Wind: It is movement of air due to difference of pressure.

LA - NINA and EL - NINO

LA - NINA and EL - NINO is the process that determines global climate distribution. It happens in oceans around the world. For example, sun heats the Pacific Ocean (largest water body). Surface water gets warmer. Water absorbs the radiations and evaporate. In troposphere, vapours condense to form clouds. Winds move clouds away. In this way, this process determines global climate. At regional and local level, different topography also contributes in determination of climate.



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(b)
Define Eutrophication. Write its process, types, effects and ways to minimize it.

Eutrophication:

It is defined as the rapid growth of algae and phytoplankton due to excessive enrichment of water bodies, primarily enrichment of nitrogen and phosphorus, and resultant disturbance of ecological balance.

Process:

- i Excessive enrichment of water bodies:
excessive enrichment of water bodies due to agriculture runoff, sewage water or industrial waste. This cause excessive presence of nitrogen and phosphorus in the water bodies.
- ii Rapid growth of algae and phytoplankton:
Excessive enrichment cause rapid growth of algae and phytoplankton.
- iii Depletion of Oxygen: Sun light cannot penetrate and small-green lives die off. They decompose by bacteria consuming oxygen.
- iv level of Carbon dioxide increases:
As green-lives die off, carbon dioxide level increases in the water bodies.
- v Suffocation of fisheries: decrease oxygen and increase carbon dioxide level cause suffocation and

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ultimately death of fisheries.

Types:

Natural Eutrophication. It is natural growth of algae and phytoplankton in water bodies and take decades to take place.

Cultural Eutrophication: It is due to human activities such as use of agro-chemicals in form of fertilizers, industrial waste, urbanization etc. These human activities cause rapid algal bloom.

Effects: (i) Biodiversity loss: Due to death of fisheries, biodiversity loss is obvious.

(ii) Death of aquatic organisms disturbs food chain.

(iii) Economic loss: Death of fisheries cause huge loss.

(iv) Tourism revenues decrease: Eutrophication destroys the aesthetics of water bodies and cause smell around the water bodies. This has bad effect on tourism and cause loss in tourism revenues.

v. Health problems: toxins are produced through them, that are bad for health.

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Controlling measures:

(i)
treatment of waste water from industries:

Industries waste water is one of the main reasons of algal bloom. Hence, treatment is required to remove nutrients such as nitrogen and phosphorus before discharging it.

(ii)
Reduce use of agro-chemicals:

By minimizing use of agro-chemicals, ~~with~~ algae and phytoplankton growth can significantly be reduced.

(iii)
Buffer vegetation along water bodies:

Buffer vegetation along water bodies can absorb excess nutrients.

(iv)
treatment of water bodies:

This process is expensive, as cleaning of each water bodies demands more efforts and time.