1/

E2021001 0027
Anushtha Saxena
Batch-1

Q1 Aerosols are particles of liquid or solid suspended in a gaseous medium.

Found in both both troposphere and stratosphere, these can be stable for a few seconds or a few months, and affect the Earth radiation budget in direct and indirect ways.

Few sources of aerosols:

1) Biomass burning: leads to a high release of aerosols in the atmosphere, increasing local albedo

2) Dust storms: Storms of huge magnitude which eject a large quantity of sand in the atmosphere, coagulating to form aerosols.

3) Volcanic activities: Contribute greatly to the overall aerosol level. Upon eruption, Emit

S2021001027
Anushthan Saxena
Batch-1

enormous amounts of ash, sulphur and nitrogen compounds and ~~some~~ carbon in large quantities.

4) Space dust: Rocks/comets burn in the atmosphere ~~upon~~ due to friction, turning into fine particles forming aerosols.

5) Ocean disturbances: Waves flipping and rising throw a large amount of salt in the air.

6) Industrial releases: Particularly high releases of black carbon, ash and sulphur based compounds in the industrial blocks leading to significant aerosol formation.

Methods of removal:

1) Gravity leads to some settlement.

2) Obstruction in the path lead to coagulations, forming larger particles and either falling down or sticking to the obstruction

3

S2021001027
Anushtha Saxena
Batch-1

~~Q5~~ ~~Crop~~ CROPWAT ~~model~~ is ~~used to predict~~

3) Precipitation scavenging: Reduction in atmospheric aerosol after precipitation.

4

S20210010027
Anushthan Saxena
Batch-1

Q2 Impact of climate change on biodiversity:

1) Ocean acidification -

Due to the oceans absorbing one-third of the total atmospheric carbon emissions, there has been a 30% drop in pH of oceans.

This acidification has rendered many crustaceans and corals unable to form skeletons and shells.

Coral reefs, which serve as a habitat to hundreds of marine life, are getting bleached due to this acidification, greatly disturbing the whole ecosystem and ~~are~~ threatening the entire human ecosystem as well.

2) Water resources -

Net increment in temperature has resulted in lower availability of water. Paired with the increased frequency of droughts and the dry periods getting drier, the plant life

S20210010027
Anushthan Saxena
Batch-1

of multiple regions struggle to survive with the overall vegetation getting drier, increasing the risk of coldfires.

3) Rise in sea levels:

Sundarbans are the largest low-lying Mangroves in the world, spanning 10 000 km.

The rise in sea level over the last 40 years has ~~led~~ lead to the destruction of nearly 28% of such Mangroove ecosystem.

4) Melting of ice.

Temperatures in the Arctic region are rising at a rate twice as fast as the other regions ~~leading~~ leading to extensive melting of ice sheets in the region.

This directly threatens the entire lifestyle of the habitants of the ecosystem, with iconic species like polar bear, ringed seals, emperor penguins and beluga whales going near extinct.

Sr021001 0027
Anushthan Saxena
Batch-1

b

6) Increment of pests and diseases -

Increment of cases of certain diseases and ~~pests~~ pests is observed, not only for humans but more so for ~~animals~~ other species.

The highly dangerous chytrid ~~fug~~ fungus which destroys marine organisms flourishes in warmer climates.

The bark beetle found in the US is active during the dry periods, leads to infestation in dry trees.

Adaptations -

1) Behavioral and morphological shift -

→ Changing the feeding hours, seeking shelters, changing sites of resting, etc.

→ Change in morphology (shape) of organisms.

S2021001027
Anushtha Saxena
Batch-1

7.

2) Phenological shift:

Change in behaviours which correspond with seasons is observed with climate change, leading to different flowering, leaf growth and maturity times in plants and shifted spawning, reproduction and migration in animals.

3) Geographical shift:

Species of plants change regions based on temperature and precipitation conditions.

With a 2°C rise in temperature, rate of the shifting of forests will be 2-5 km/year, 10 times ~~higher than~~ the current rate.

8/

S2021001027
Anushtha Sarkar
Batch-1

Q3: MaxEnt (Maximum Entropy) model is used to predict the future climate or geographical suitability of any crop.

The model uses future climate data of maximum and minimum temperatures (available on the worldclim website) and the current suitability data of a crop (an excel data sheet) and gives various plots and a picture depicting favourable co-ordinates for the particular crop.

We obtain climate data from the worldclim website and clip these tif files for the Indian subcontinent using QGIS. Then we convert these tif files into asc files with the help of any data converting script ~~(eg: Using a R Se~~ (eg: using an R script), and then giving these asc files along with the crop data as input to

the MaxEnt model, which then returns a colorful description in picture form of the future favourable/ unfavourable cultivation spots for that crop.

10

S20210010027
Anushtha Saxena
Batch-1

Q4 A climate resilient village is a blueprint of the various practices and plans put into action to lead to high food security and great resource management, implementing different agricultural schemes as well as climate change policies.

11

S20210010027
Anushthan Saxena
Batch-1

Qs CROPWAT used together with CLIMWAT useful to predict the impact of climate change on Cropwater requirement of agricultural crops.

CROPWAT gives the irrigation scheduling and prediction of temperature and humidity, and can evaluate a farmer's irrigation practices. CLIMWAT adds on to this outcome the variability of future rainfall conditions and humidity changes and provides further insight on how the changing conditions will affect the crop water requirement in addition to the irrigation scheduling