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Carbon Neutral and its Importance in Agriculture

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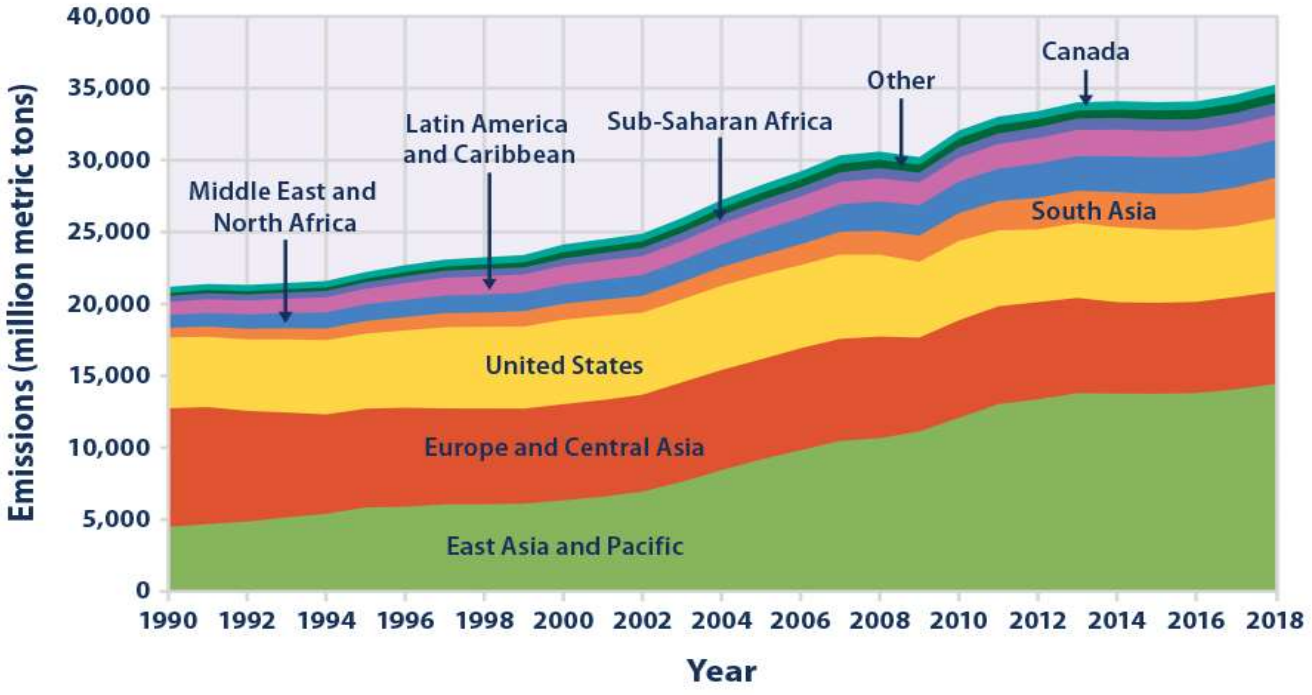
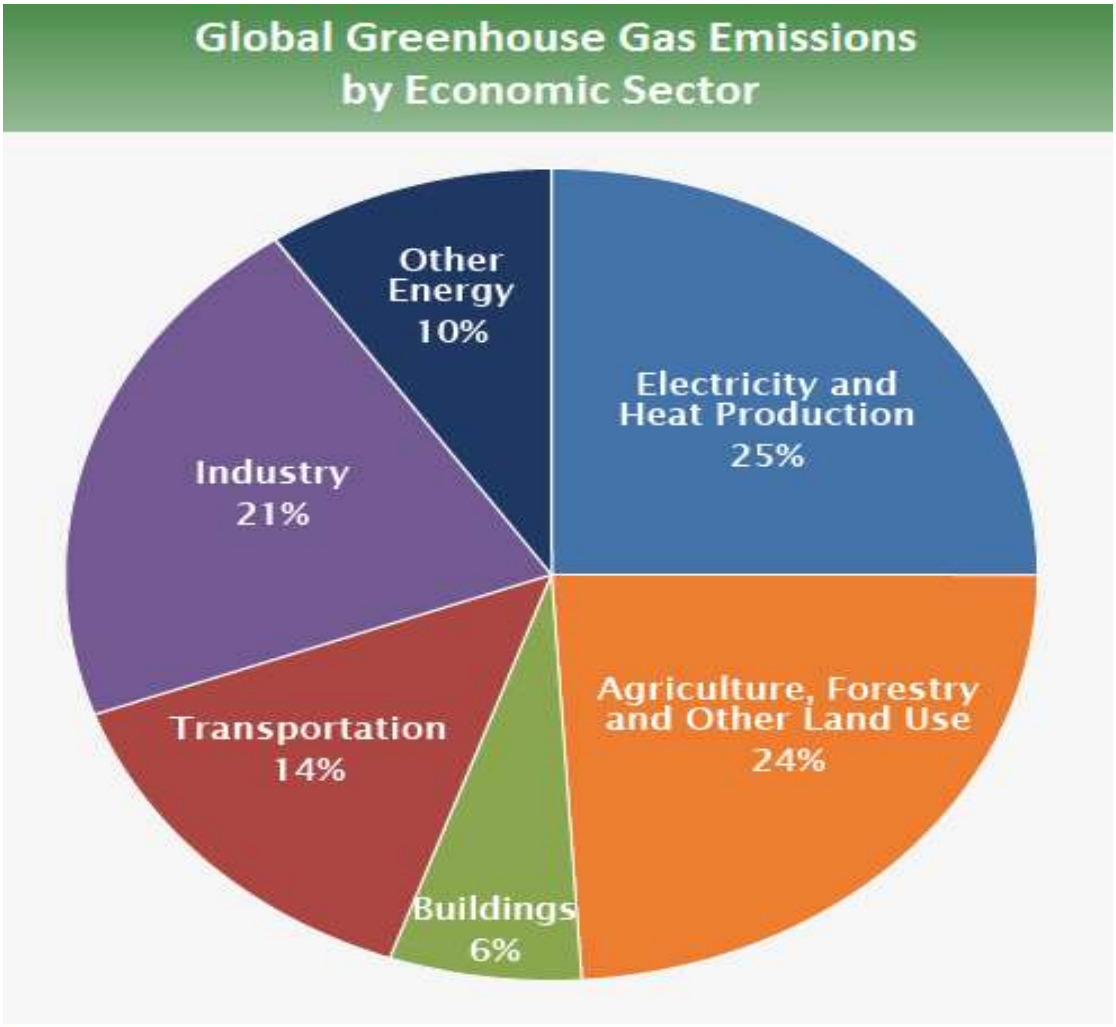
SUMMARY

The emission of greenhouse gases (GHG) increases continuously due to natural and man-made factors. The Intergovernmental Panel on Climate Change (IPCC) and the COP26 summit of the United Nations Framework on Climate Change are working on reducing GHG emissions through carbon neutrality and carbon credits. Carbon neutrality refers to achieving a balance between carbon emissions and carbon absorption from the atmosphere in carbon sinks. A carbon credit, also known as an offset credit, is a transferable financial instrument certified by governments or independent certification bodies. It represents an emission reduction that can be bought or sold. Carbon-neutral farming is an agricultural management system that helps the land release fewer greenhouse gases and store more carbon. Agriculture is considered one of the main sources of carbon dioxide (CO2) and methane (CH4), which are two potent greenhouse gases. However, it also has significant potential to sequester and store carbon in plants, trees, and soils.

INTRODUCTION

It is anticipated that greenhouse gas (GHG) emissions will experience a 50% increase by 2050, primarily due to the projected rise of 70% in energy-related CO2 emissions. If these emissions continue to rise at their present rate, it will disrupt the carbon (C) cycle's equilibrium, resulting in irreversible alterations to the climate system. Hence, a coordinated endeavor to diminish C emissions and enhance C sequestration must be initiated through various socio-economic and technological interventions. Globally, the agricultural sector accounts for approximately 24% of GHG emissions, while in India, it contributes 17.6% to the total net CO2 equivalent emissions. Agriculture in India is responsible for fifty percent of the country's methane emissions and a substantial amount of nitrous oxide. The primary sources of emissions in Indian agriculture include enteric fermentation from livestock, rice cultivation, manure management, burning of crop residues, the use of nitrogen fertilizers, and post-harvest plowing, which aerates the soil and allows carbon to escape into the atmosphere.





Terminology check

CARBON FOOTPRINT
Total amount of greenhouse gas emissions, including CO_2, generated by an event, individual, organisation, service, place, or product, during a given time.

CARBON CREDIT
A carbon credit represents the right to emit 1 metric ton of CO_2.

CARBON OFFSETTING
A carbon offsets represent reduction of 1 metric ton of CO_2, in order to compensate for emissions made elsewhere.

CARBON NEUTRALITY
A state of balance between the CO_2 emitted and removed from the atmosphere.

*Note: Both carbon credits and offsets represent the emission of carbon and are used interchangeably. But credits represent the right to emit that carbon, whereas offsets represent production of the same amount of sustainable energy to counterbalance the use of fossil fuels.

Carbon Footprint and Carbon Credit

What is a carbon footprint?

A carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by our actions.

What Are Carbon Credits?

Carbon credits are certificates that grant the holder permission to release a specific quantity of carbon dioxide or other greenhouse gases. Each credit allows for the emission of one metric ton of carbon dioxide or its equivalent in other greenhouse gases.

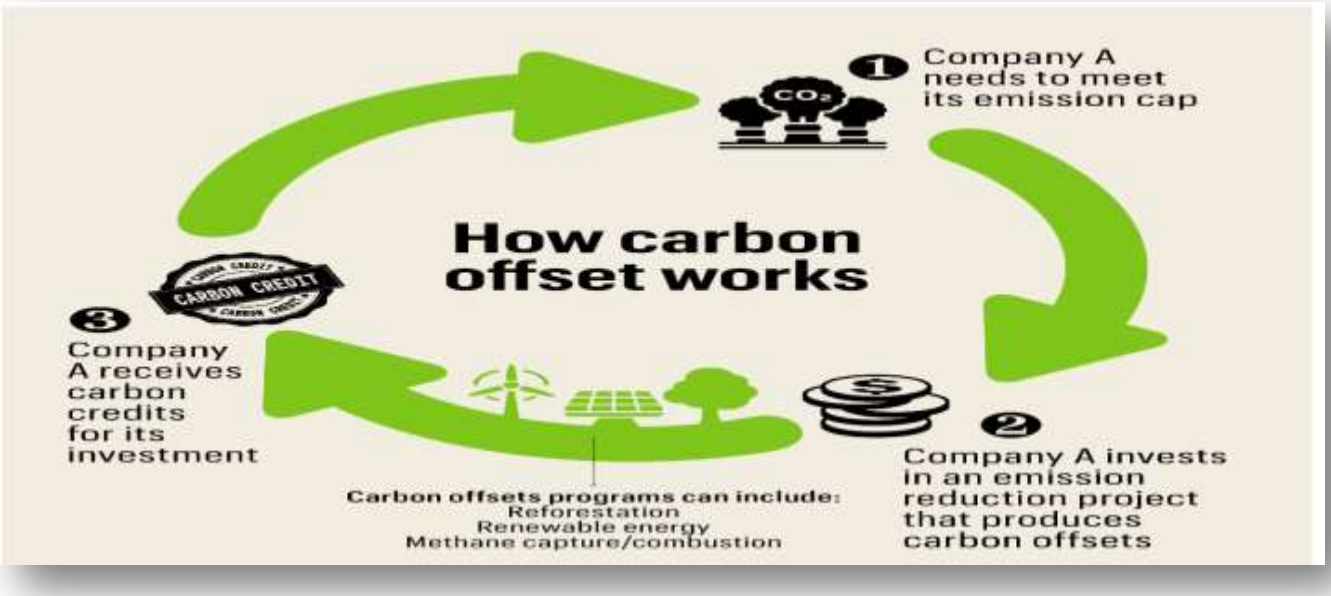
• The concept of carbon credits was developed as a mechanism to decrease greenhouse gas emissions.

• Companies receive a predetermined number of credits, which gradually decrease over time, and they have the option to sell any surplus credits to other companies.

• Carbon credits provide a financial incentive for companies to reduce their carbon emissions. Even if reducing emissions is challenging for certain companies, they can still operate by purchasing additional credits at a higher cost.

• Carbon credits are based on the cap-and-trade model that successfully reduced sulfur pollution in the 1990s.

• During the Glasgow COP26 climate change summit in November 2021, negotiators reached an agreement to establish a global market for trading carbon credit offsets.



What is carbon neutrality?

• Carbon neutrality refers to achieving a state where the emission of carbon is balanced by the absorption of carbon from the atmosphere in carbon sinks. The process of removing carbon dioxide from the atmosphere and storing it is known as carbon sequestration. To achieve net zero emissions, all global greenhouse gas (GHG) emissions must be counteracted by carbon sequestration.

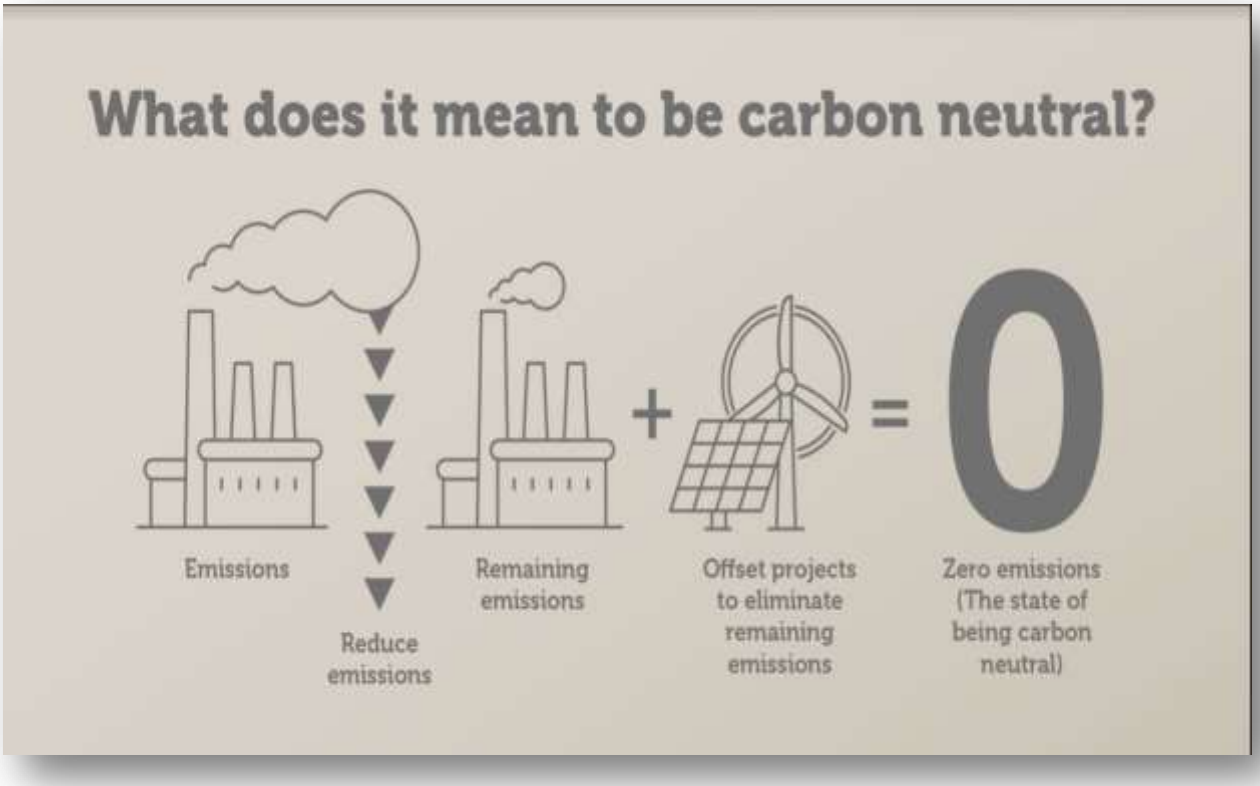
• A carbon sink is any system that absorbs more carbon than it releases. The primary natural carbon sinks include soil, forests, and oceans.

• Estimates indicate that natural sinks remove approximately 9.5 to 11 gigatons (Gt) of CO2 per year. However, in 2020, annual global CO2 emissions reached 36.0 Gt.

• Currently, there are no artificial carbon sinks capable of removing carbon from the atmosphere on the scale required to combat global warming.

• The carbon stored in natural sinks like forests can be released into the atmosphere through forest fires, changes in land use, or logging activities.

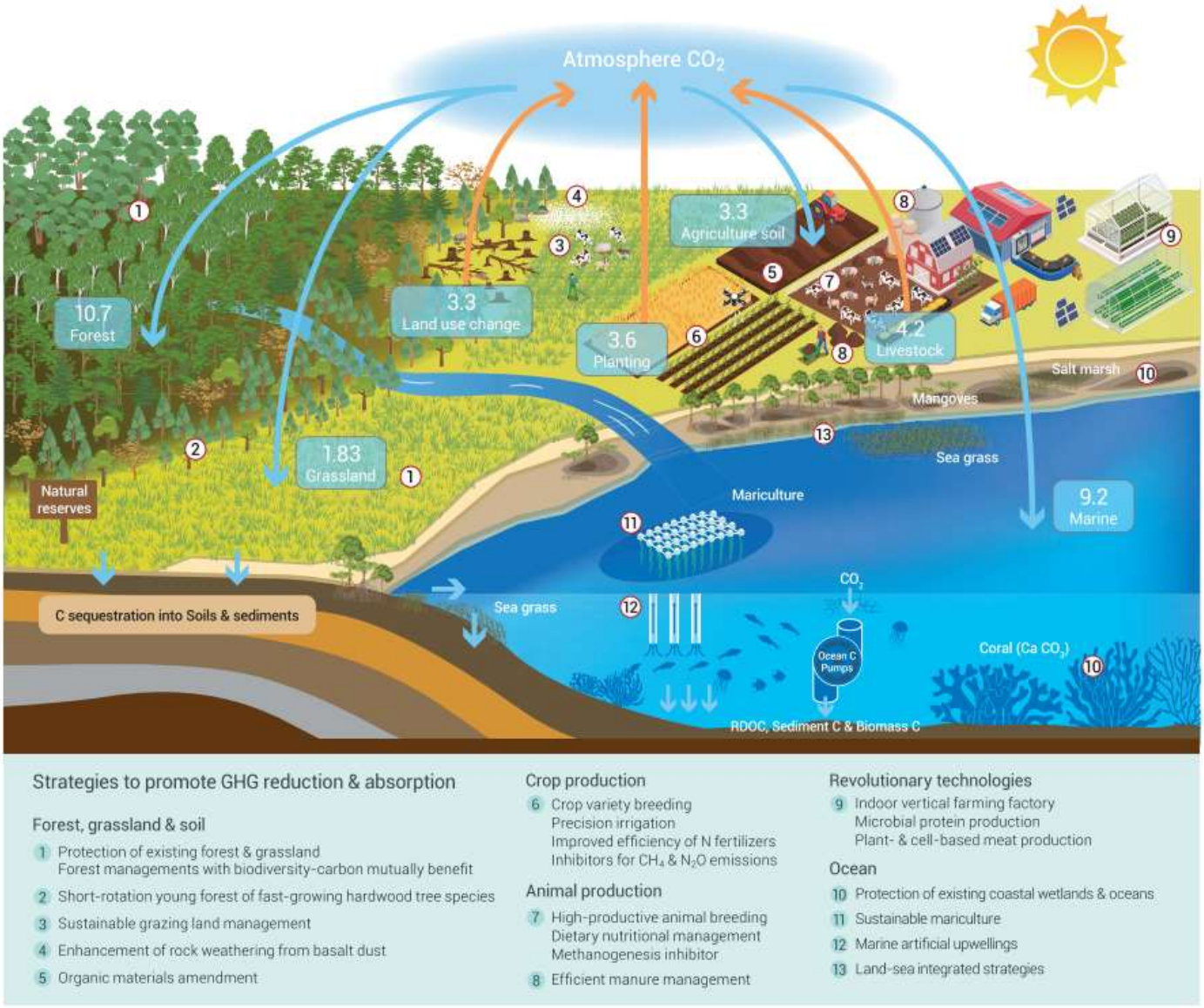
Hence, reducing carbon emissions is crucial in order to achieve climate neutrality and prevent the release of carbon stored in natural sinks.



According to the definition of the Intergovernmental Panel on Climate Change (IPCC), carbon neutrality, or net zero CO_2 emissions, refers only to carbon dioxide emissions and is a state of balance between the CO_2 emitted into the atmosphere and the CO_2 removed from the atmosphere.

Approaches and Advantages of Carbon Neutrality

- In order to mitigate the severe impacts of climate change, it is imperative for communities and society at large to achieve carbon neutrality.
- This will result in a reduction in environmental pollution and improvements in overall health.
- Additionally, it will foster the creation of green jobs and drive economic growth.
- Furthermore, carbon neutrality will contribute to a decrease in climate change effects and enhance food security.
- Moreover, it will promote an increase in biodiversity and lead to improvements in the health and condition of the oceans.



Contribution of Agriculture Sector in Carbon Neutrality

What is carbon neutral agriculture?

- Carbon farming is an agricultural management approach designed to enhance carbon storage in the land and minimize the release of greenhouse gases into the atmosphere.
- In India, farmers have the opportunity to preserve and rehabilitate vegetation, including tree cover along water bodies, through effective management of their grazing lands.
- Similarly, farmers can adopt strategies to reduce the use of fertilizers, such as applying compost or biochar, which helps decrease the amount of greenhouse gases stored in vegetation.

Need of carbon farming

- There is a strong connection between agriculture and climate change.
- Agriculture is recognized as a significant contributor to the emissions of carbon dioxide (CO2) and methane (CH4), both potent greenhouse gases. However, it also has the potential to sequester and store carbon in plants, trees, and soils.
- Achieving a more carbon-neutral agriculture is feasible by implementing appropriate farm management practices that optimize the carbon balance in farming systems.
- These practices can encompass strategies aimed at altering livestock feeding habitats, reducing CH4 emissions, minimizing the use of farm inputs such as fuels, pesticides, and fertilizers, and promoting practices that enhance carbon storage.

Top 10 Carbon Farming Practices

Carbon farming practices are prevalent in regenerative agriculture, permaculture, organic farming, and other food production methods. Examples of effective and practical farming methods include:

- Using the residual biomass after harvest as organic to cover the soil, instead of burning it
- Replacing conventional tillage practices with conservation tillage, i.e., reduced/no-till
- Cultivating cover crops during the off-season instead of leaving the croplands bare
- Alternating monocultures with high-diversity crop rotations and integrated farming practices
- Substituting intensive application of chemical fertilizers with integrated nutrient management and precision farming
- Integrating trees into agriculture through cropland agroforestry
- Reintroducing livestock into crop production for nutrient cycling
- Protecting carbon-rich soils that act as natural carbon sinks
- Rotating livestock periodically through pastures and a series of small paddocks
- Using compost to restore soil fertility and increase grassland carbon storage

India Intiative for Carbon Neutrality

India's first carbon neutral panchayat –

Palli village in Jammu's Samba district has become the country's first panchayat to become carbon neutral, fully powered by solar energy and with all its records digitized and saturation of benefits of all the Central schemes. Inaugurating the 500 KW solar plant at the country's first carbon-neutral panchayat, Prime Minister Narendra Modi said it would take three weeks to move a 'sarkari' file from Delhi to Jammu and Kashmir but this project with the help of villagers was completed in a record time of three weeks.

Kerala state declared first carbon neutral seed farm in India –

- A significant reduction in carbon emission has helped the seed farm, under the Agricultural Department, achieve carbon neutral status, he said making the announcement.
- The total amount of carbon emission from the farm, located at Thuruthu in Aluva, in the last one year was 43 tons but its overall procurement was 213 ton, he said.
- Compared to the emission rate, as many as 170 tons of more carbon have been procured at the farm, which helped it to be declared as the first carbon neutral seed farm in the country.

Carbon neutral rice cultivation technique of Maharatstra –

Chanrdashekhar H Bhadsavle is the person who is largely responsible for the success story of Saguna baug and development of SRT (Saguna Rice Technique). SRT is a zero till, Conservation Agriculture (CA) type of cultivation method evolved at Saguna Baug, Neral, Dist. Raigad, Maharashtra.

CONCLUSION

Carbon neutrality in agriculture is a key element in building a sustainable and resilient future. By embracing carbon neutrality, the agricultural and industry can play a vital role in global efforts to combat climate

change. It is a fundamental step towards ensuring a sustainable and environmentally friendly food production system for future generations.

REFERENCES

Arora NK and Mishra I (2021) COP26: more challenges than achievements. Environ Sustain 4:585–588.

Chemistry Letters, 20(4), 2277-2310.Wang, F., Harindintwali, J. D., Yuan, Z., Wang, M., Wang, F., Li, S. and Chen, J. M.(2021). Technologies and perspectives for achieving carbon neutrality. The Innovation,2(4).

Chen, L., Msigwa, G., Yang, M., Osman, A. I., Fawzy, S., Rooney, D. W. and Yap, P. S.(2022). Strategies to achieve a carbon neutral society: a review. Environmental

https://pib.gov.in. India initiative on carbon neutrality.

Pandey, D. and Agrawal, M. (2014). Carbon footprint estimation in the agriculturesector. Assessment of Carbon Footprint in Different Industrial Sectors, Volume 1, 25-47.