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Agriculture and Changing Adverse Climate

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Farmers and farming communities around the world are facing more and more challenges as the environment warms up and the effects of global warming become more frequent and severe. Agriculture is badly harmed by climate change even though it is mostly to blame for it thanks to greenhouse gas (GHG) production. The frequent dry spells, heat waves, and variable rainfall brought on by climate change are also a threat to India's agricultural development. In addition, the cropping cycle and farm activities have been negatively impacted by the shifting rainfall patterns, which take the form of delayed onset or early withdrawal. One must handle the difficulty of fulfilling the growing need for food production while reducing costs due to an expanding population and the necessity to increase food production and reducing the GHG emissions from agriculture.

Agriculture Affecting Climate

Greenhouse Gases: Particularly in agriculture, large amounts of the potent greenhouse gases nitrous oxide and methane are released. Livestock create methane during digestion as a result of enteric fermentation, which is then expelled by belching. Additionally, it may escape from landfills' organic waste and manure storage. The only source of 44% of methane emissions is livestock. Organic and mineral nitrogen fertilisers constitute an indirect source of 53% of nitrous oxide emissions. Nitrogen-rich fertilisers contaminate water and endanger the aquatic ecology.

Monocultural Practices: The loss of biodiversity is a result of pesticide and herbicide use, monocultures, and other factors. Monoculture agricultural techniques rely on synthetic fertiliser, plough fields often, and leave the soil naked for much of the year. Due to these methods, soils have less organic matter and are unable to develop deep, intricate root systems, which reduces their ability to hold water. The destruction of natural ecosystems can have a severe impact on the surrounding fauna, biodiversity, and microclimate. This can happen when uncultivated land is cleared for farming. Large volumes of water are required by many agricultural industries, which could lead to drought and water scarcity.



Changing Climate Affecting Agriculture

Extreme heat: For crops to develop, the right soil, water, sunlight, and heat are necessary. Extreme heat events, less precipitation, and a scarcity of water have, however, reduced crop yield.

Shifts in Rainfall Patterns: Over the next few years, it is predicted that these changes will become more pronounced across the nation. Even within the same regions, this is likely to result in prolonged dry spells and more severe heavy rainstorms.

Floods: Many agricultural sections of the nation have experienced flooding, which has wreaked havoc on cattle and crops, hastened soil erosion, and polluted water.

The Scenario of India

After China and the US, India is the third-largest emitter of greenhouse gases. The International Energy Agency reported that India released 2,299 million tonnes of carbon dioxide (CO₂) in 2018. This makes up 7% of the world's GHG emissions. 18% of the total emissions across the country come from agriculture and animals.

According to a research by the International Maize and Wheat Improvement Centre (CIMMYT), India has the potential to reduce the sector's yearly greenhouse gas emissions by 18%. According to the study, these three actions would be sufficient to offset this drop by 50%:

1. Effective fertiliser use
2. Using zero-tillage techniques
3. Control of water utilised to irrigate rice fields.

Zero tillage : also known as no-till agriculture, is a farming method in which the soil is only disturbed along the slit or in the hole into which the seeds are planted, and the seedbed is covered and protected by the saved residue from previous crops.

Challenges

convincing the farmers to transition to a different set of methods and altering their socioeconomic outlook. attempting to influence people to treat agricultural lands as an ecosystem as a whole rather than as a factory for generating crops. ensuring that all farmers have improved market connections so they can receive more money for their produce.

Measures That Can Be Taken

- A combination of tools and techniques covering capacity building, field demonstration, extension and outreach will enable faster adoption.
- **Low External Input Systems:** Moving our current agricultural production systems from an input-intensive regime to low external input systems requires engaging with farmers to first demonstrate alternate practices and then convincing them to change their practices. Concepts such as Low External Input Sustainable Agriculture (LEISA) are receiving increased attention as a sustainable alternative to chemical farming.
- Zero Budget Natural Farming (ZBNF) is an approach that encourages farmers to use inexpensive, locally available inputs and should be pushed to reduce the usage of chemical pesticides and fertilisers.
- Small and marginal farmers should be persuaded to switch to alternative packages of practises, their efficacy should be shown, and they should be encouraged to cooperate with Krishi Vigyan Kendras to broaden their reach.
- As an illustration, cotton growers in Maharashtra's Yavatmal district are switching to a set of practises that reduce water use (through in-situ soil moisture conservation and other demand management measures), encourage the use of biofertilizers, and lower the environmental impact of cotton cultivation..

Low External Input Sustainable Agriculture (LEISA)

- A production activity that employs synthetic fertilisers or pesticides at lower rates than are typically advised by the Extension Service is referred to as low-input agriculture. However, it does not imply that these materials will be removed.
- By placing more focus on cultural practises, Integrated Pest Management, and the use of on-farm resources and management, yields are maintained.
- The LEISA idea aims to maximise the complimentary and synergistic impacts of various farming system components in order to make the most use of locally accessible resources. The utilisation of external inputs is complimentary.

Conclusion

All industries will need to contribute to mitigation and adaptation measures in the fight against climate change. By improving the knowledge and abilities of our farmers, it will be possible for agrarian nations to raise productivity without increasing the environmental impact of agriculture.