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Impact Of Natural Disasters On Agriculture In India**Dr.Anju Pathak****Lecturer****Department of Zoology****Government R.D. Girls College****Bharatpur****Rajasthan****(Received:29January2020/Revised:18 February2020/Accepted:26February2020/Published:29February2020)****Abstract**

This study analyzes the impact of natural disasters on agriculture sector in India. since historical times, India has been vulnerable to large number of natural disasters like earthquakes, floods, drought and pest attacks. India's geographic allocation weather and other physical features make it more susceptible to such disasters. The rising population of the country has driven farmers to settle in risky areas like flood plains , drought prone areas, cyclone prone areas and seismic zones. Natural disasters leading to a failure of crops have a devastating impact on the economy of a country. Prices would rise to an extremely high level and the poor would starve. Floods , droughts cyclones , earthquakes and landslides are some of the major natural disasters that repeatly and increasingly affect India. In the 1970s and the 80s, droughts and famines were the biggest killers India. But the situation is different today's. It is probably a combination of factors like better resource management and food security measure that has greatly reduced the deaths caused by droughts and famines. Presently floods high winds and earthquakes dominate the scenario, with ever increasing numbers in the last years. The natural disasters directly impact agriculture and food security sectors. Therefore it is one of the largest concerns for most of the developing nations. Drought causes heavy crop and livestock losses over wide areas of land but infrastructure and productive capacity largely remain unaffected . agricultural loses due to pests , disease, wild animals, insects an weeds are considerable. Insect outbreaks are generally the result of a combination of temperature , monoculture of crops, introduction of plants to new locations, weather pattern and migration. The best way to deal with such disasters is to be prepared for any eventuality as damages can be considerably minimized if adequate preparedness levels area achieved.

Keywords: Natural disasters, Droughts, Floods, Earthquakes, Pest Attacks.**Introduction**

Since ages, agriculture has been playing a vital role in developing Indian economy as it is the backbone for Indian economy. More than 70% of our rural people depend on agriculture for their livelihood and around 60% of the land is occupied by agriculture activities (FAO, 2019). 18% of India's gross domestic product (GDP) and 50% of country's workforce is accounted by agriculture. Majority of Indians are dependent on agriculture directly or indirectly for their livelihood. The share consists of landowners, tenant farmers who cultivate a piece of land,

agricultural labourers who are employed on these farms, and people doing business of agricultural products. According to FAO (2019), India is the largest producer, consumer and importer of pulses in the world . Next to China, India is the second largest fruit producer in the world. The production of horticulture crops was estimated at record million tons in 2017-18 (Horticulture at a glance, 2018). India is also among the top producers of rice, wheat, pulses, cotton, sugarcane, tea, tobacco leaves, spices, spice products, etc. The major kharif crops grown in India are rice, jowar, bajra, maize, cotton, groundnut, jute, sugarcane, turmeric, pulses, etc. The major rabi crops are wheat, oat, gram, pea, barley, potato, tomato, onion, oil seeds and the crops cultivated in zaid are cucumber, bitter gourd, pumpkin, watermelon, muskmelon, moong dal, etc. The driving forces that make these crops grow efficiently in India are the unique weather and soil conditions. Indian agriculture also addresses food security for the nation. The National Food Security Act in India was enacted in 2013 with the aim to provide food and nutritional security to people by ensuring access to adequate amount of quality food at affordable prices). Recently there has been increased attention for natural disasters and their impact. In the years before the 1980s, research on disasters and hazards only received little attention. Especially in the last decade a number of large scale natural disasters occurred in various parts of the world. Interesting is the list of most expensive natural disasters in the last twenty years. This media attention increases the pressure on governments and they could therefore feel the urge to support the disaster area. Not only infrastructure, buildings and other physical capital could be destroyed, but also cultivated land. The rebuilding of physical capital is in the interest of both consumers and producers. In the aftermath of a natural disaster consumers and producers could also have different interests, governments have to choose whom to support. To illustrate these different interests, a theoretical example is used. This theoretical example starts with a small open economy. In a small open country model a natural disaster destroys part of the cultivated agricultural crops. Then there is an exogenous supply shock since most supply is destroyed by the natural disaster. If this country would be isolated, domestic price goes up due to inelastic demand and lower domestic supply. In this example it is a small open economy. If in this open economy there is an absence of trade distortion, the gap in supply would be compensated by the inflow of import at world market prices and thus (assuming that demand will not change) the original domestic price is the equilibrium price again. The result is that there is no welfare loss for consumers (they still pay the same price for their food). For domestic agricultural producers

on the other hand there is a welfare loss. Although they deliver less output, the price does not change and their revenue is lower than it would be in an isolated country.

Climate-Resilient Agriculture

- Climate-resilient agriculture (CRA) is an approach that includes sustainably using existing natural resources through crop and livestock production systems to achieve long-term higher productivity and farm incomes under climate variability.
- This practice reduces hunger and poverty in the face of climate change for forthcoming generations.
- CRA practices can alter the current situation and sustain agricultural production from the local to the global level, especially in a sustainable manner.
- Improved access and utilisation of technology, transparent trade regimes, increased use of resources conservation technologies, an increased adaptation of crops and livestock to climatic stress are the outcomes from climate-resilient practices.
- Most countries have been facing crises due to disasters and conflicts; food security, however, is adversely affected by inadequate food stocks, basic food price fluctuations, high demand for agro-fuels, and abrupt weather changes.

Strategies And Technologies For Climate Change Adaptation

Tolerant Crops

- Patterns of drought may need various sets of adaptive forms.
- Example: To reach deficient downpour conditions, early maturing and drought-tolerant cultivars of green gram (BM 2002-1), chickpea and pigeon pea (BDN-708) were brought on selected farmer's fields in Aurangabad district of Maharashtra (rainfall of 645 millimetres).
- This provided 20-25 per cent higher yield than the indigenous cultivars.

Water Management

- Water-smart technologies like a furrow-irrigated raised bed, micro-irrigation, rainwater harvesting structure, cover-crop method, greenhouse, laser land levelling, reuse wastewater, deficit irrigation and drainage management can support farmers to decrease the effect of variations of climate.
- Various technologies based on a precision estimation of crop water needs; groundwater recharge techniques; adoption of scientific water conservation methods; altering the fertilizer and irrigation schedules; cultivating less water requiring varieties; adjusting the planting dates;

irrigation scheduling; and adopting zero-tillage which may help farmers to reach satisfactory crop yields, even in deficit rainfall and warmer years.

Agro-Advisory

- Response farming is an integrative approach; it could be called farming with advisories taken from the technocrats depending on local weather information.
- The success of response farming, viz., decreased danger and enhanced productivity has already been taken in Tamil Nadu and many other states.
- Response farming can be a viable choice for climate change adoption strategies, for the variations of climate is not a sudden one.
- The main cause for the success of response farming is because of both location and time-specific technologies.
- It is time to take forward the success of response farming to the entire farming community.

Soil Organic Carbon

- Different farm management practices can increase soil carbon stocks and stimulate soil functional stability.
- Conservation agriculture technologies (reduced tillage, crop rotations, and cover crops), soil conservation practices (contour farming) and nutrient recharge strategies can refill soil organic matter by giving a protective soil cover.
- Integrated nutrient management deals with the application of organic and inorganic fertilizers, in addition to farmyard manure, vermicompost, legumes in rotation, and crop residue for sustaining soil health for the long term.
- Feeding the soil instead of adding fertilizers to the crop without organic inputs is the key point for the long-term sustainability of Indian agriculture.

National Programmes For Climate Change Adaptation

- The **National Mission of Sustainable Agriculture** was implemented in 2010 under the **National Action Plan on Climate Change (NAPCC)** to promote the judicious management of available resources and this was one of the eight missions under NAPCC.
- The **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)** was launched in 2015 to address the issues of water resources and provide a permanent solution that envisages Per Drop More Crop, by promoting micro / drip irrigation for the conservation of maximum water.

- The **Paramparagat Krishi Vikas Yojana mission** was executed to extensively leverage adaptation of climate-smart practices and technologies in conjunction with the Indian Council of Agricultural Research and state governments of India.
- To mitigate climate extreme actions, **Green India Mission** was launched by the GOI in 2014 under the umbrella of NAPCC with the primary objective of protecting, restoring and enhancing India's diminishing forest covers, thereby reducing the deleterious effects of climate change.
- To protect the soil health, GOI has launched the **Soil Health Card scheme** with the main objective of analysing cluster soil samples and advocating farmers regarding their land fertility status. Additionally, Neem-Coated Urea was also introduced to minimise the excess addition of urea fertilizers, thereby protecting soil health and supplying plant nitrogen.
- To encourage farmers with more income benefit and ecosystem protection, programmes such as the **National Project on Organic Farming and National Agroforestry Policy** was introduced in 2004 and 2014 respectively.
- These policies are aimed at supplying plant nutrients in the form of organic amendments, soil carbon stock improvement, and soil protection from erosion loss.

Role Models

- Andhra Pradesh, Himachal Pradesh, Sikkim, etc, have already initiated several programmes to adopt and promote organic farming practices on a wider scale. Sikkim is an organic state.
- The ICAR, through its network research Institutes, state agriculture universities and all line departments is implementing agriculture contingency plans in about 650 districts of India towards climate change preparedness for the last seven years.
- These models are taken forward to SAARC countries towards adaptation to climate change impacts like floods, cyclones, droughts, and heat waves and seawater intrusion.
- ICAR has established climate-resilient villages across India in 151 districts, which are replicated by the state governments towards the overall objective of building carbon positive villages.

Way Ahead

In a nutshell, following steps are crucial to build climate resilient agriculture systems and achieve sustainable development goals (SDG) in India:

- Adaptation of appropriate mitigation technologies such as the cultivation of tolerant breeds to overcome the climate stress
- Water and nutrient management for efficient productivity and resource utilisation
- Agro-advisories for timely crop monitoring

- Conservation agricultural practices to build soil organic carbon and to build congenial environment for plant growth, manure management
- Reduction of greenhouse gas emissions from all agriculture and non-agricultural sources has to be prioritised. The introduction of neem-coated urea is one such policy intervention
- Structured training is essential to build confidence in stakeholders and sensitise them to understand the climate change events
- Fine tuning the gap between current management practices and essential agro-advisories
- Implementing CRA across the country is the need of the hour
- Flagship farmer-oriented programmes are needed to improvise skills in agriculture and allied sectors
- Collaboration between farmers, research institutions, funding agencies, governments, and non-government organisations and private sectors combine strengths to promote CRA.

Conclusion

India is one of the most disaster-prone countries in the world. The location and geographical features render it vulnerable to a number of natural hazards such as cyclone drought, floods, earthquakes, fire, landslides and avalanches. The country has an integrated administrative machinery for disaster management at National, Provincial (State), District and Sub-District levels. India has a federal system of Government with role of Union and Provincial Governments specified by the Constitution, The responsibility for undertaking rescue and relief measures in the event of natural calamities is that of the State Government concerned. The Union Government supplements the State relief efforts by initiating supportive action. Elaborate procedural mechanism outlined in relief manuals & codes and backed up by Contingency Action Plans along with allocation of resources on a regular basis facilitates emergency management operations. A National Contingency Action Plan has been notified. Farmers resort to multiple formal and informal options to avoid the income risks. Based on our analysis it can be concluded that the formal risk aversion mechanism has limited scope in the disaster-prone areas of the country. Addressing the assessment and adequacy of compensation amount along with information asymmetry in the formal insurance market should be a top priority for improving the situation. The ex-post measures under formal risk coping also have limited impact, indicating the underdevelopment of insurance and commercial credit markets in the region.

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