



Impression of COVID-19 Pandemic on Food Systems, Natural Environmental Resources and Agriculture in India: A Review

**R. K. Naresh¹, Saurabh Tyagi², M. Sharath Chandra^{1*}, B. Chandra Shekar³,
Pradeep Kumar Singh¹, Aryan Baliyan⁴, Prashant Ahlawat⁵
and Polepaka Shalini⁶**

¹Department of Agronomy, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, U. P, India.

²Department of Agriculture and Agri Informatics, Shobhit University Modipuram Meerut, U. P, India.

³Department of Soil Science and Agricultural Chemistry, COH, Mojerla, Sri Konda Laxman Telangana State Horticultural University, Mulugu, Telangana India.

⁴Department of Soil Science and Agricultural Chemistry, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, U. P, India.

⁵Department of Plant Pathology, Chaudhary Charan Singh University, Meerut, U. P, India.

⁶Department of Agronomy, Sam Higginbotham Agricultural University, Allahabad, U. P, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJECC/2021/v11i630429

Editor(s):

(1) Dr. Wen-Cheng Liu, National United University, China.

(2) Dr. Anthony R. Lupo, University of Missouri, USA.

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Complete Peer review History: <https://www.sdiarticle4.com/review-history/71853>

Review Article

Received 01 June 2021

Accepted 05 August 2021

Published 16 August 2021

ABSTRACT

The COVID-19 pandemic is affecting food and nutrition security through economic and social systems shocks, food system disruptions and gaps in coverage of essential health and nutrition services. Food systems in low- and middle-income groups must adapt and strengthen food and nutrition security in the wake of COVID-19. Smallholder farmers are a crucial part of the food value

*Corresponding author: E-mail: sharathagrico@gmail.com;

chain in India, as well as a critical element of the global food system. The COVID-19 pandemic has brought new risks that threaten livelihoods as well as food security. Post the *rabi* harvest in April, farmers prepare for the next (*khari*) season in May. However, the COVID-19 induced disruptions have reduced production capacity for farm inputs and have led to an increase in price, making these resources inaccessible to smallholder and marginal farmers in the country. The corona-virus pandemic has caused a global reduction in economic activity and although this is major cause for concern, the ramping down of human activity appears to have had a positive impact on the environment. The COVID-19 lockdown has several social and economic effects. Additionally, COVID-19 has caused several impacts on global migration. Carbon emissions have dropped, and the COVID-19 lockdown has led to an improvement in air quality and a reduction in water pollution in many cities around the globe. We found that the COVID-19 lockdown in India has primarily impacted farmers' ability to sell their crops and livestock products and decreased daily wages and dietary diversity. In this context, we aim to synthesize the early evidence of the COVID-19 impact on the Indian agricultural system viz., production, marketing and consumption followed by a set of potential strategies to recover and prosper post-pandemic. Findings indicate that the pandemic has affected production and marketing through labour and logistical constraints, while the negative income shock restricted access to markets and increased prices of food commodities affecting the consumption pattern.

Keywords: Corona virus pandemic; Environmental impacts Farm to fork; Food security.

1. INTRODUCTION

Mobility restrictions imposed in early 2020 to combat the spread of COVID-19, a disease caused by a novel coronavirus (SARS-CoV-2), have wreaked havoc on economies around the world, disproportionately hurting people who are already poor or malnourished [1]. Because agriculture provides income to more than two-thirds of the world's poor [2], it's critical to understand how policies aimed at preventing the disease's spread affect smallholder farmers. Early lessons on the effects of a shutdown, as well as insights into how this varies by context, can influence policy for recovery and increase preparedness for future tragedies as governments aim to ameliorate the welfare implications of disrupted agricultural value chains. All of these shocks, without a doubt, have an impact on agricultural systems; nevertheless, pandemic shocks have an impact on all sectors of an economy. Droughts tend to be confined, affecting only the associated industry or stakeholders, whereas pandemics alter food demand and supply, affecting the entire supply chain [3]. About 126 million smallholder farmers in India produce more than 40% of the country's grain and more than half of its fruits, vegetables, oilseeds, and other crops. India produces a large portion of the world's staple foods, such as rice and wheat, and agriculture employs about half of the country's people. Low rainfall, price volatility, and growing debts are all threats to Indian farmers. The COVID-19 epidemic, on the other hand, is posing new problems to an already vulnerable industry. Coronavirus disease

(COVID-19) is spreading over the world, posing a threat not only to human health but also to the global economy and ecology. Governments have put limitations on the movement of persons and vehicles, as well as halted economic activities, as a result of COVID-19 [4]. The results of such restrictions have been impressive, with considerable reductions in pollution levels, including greenhouse gas emissions, nitrogen dioxide, black carbon, and water pollution [5,6]. For example, during the lockdown period in Spain, air pollution levels fell by 50%, with nitrogen dioxide (NO₂) and black carbon (BC) rates falling by 45–51 percent [6]. Water pollution in Italy was greatly decreased as a result of the lockdown, and water canals became more translucent than they were prior to the shutdown [7]. Similarly, during India's lockdown, the surface water quality in the Vembanad Lake improved dramatically, with suspended particle matter (SPM) dropping by 15.9% compared to pre-lockdown standards [8]. Meanwhile, COVID-19 is having a negative impact on the environment due to a large volume of domestic and medical litter, as well as a lack of attempts to recycle medical waste due to the fear of spreading COVID-19 to those who are involved in recycling [4].

There are only 38 percent of the nation's sewage that can be treated, which results in more than 38,000 million litres of untreated sewage being discharged into rivers every day in India [9]. Additionally, industrial effluents pollute the rivers. As much as 12 percent of the total volume of effluents in the river Ganga comes from industrial

sources. Numerous industries, large and small, were closed from March 22, 2020 to September 30, 2020 as a result of the COVID-19 nationwide lockdown. As a consequence, the water quality and quantity in many rivers have improved in a short amount of time, particularly in the Ganga River, which runs 2,575 kilometres and crosses a wide range of landmass [10,11,12]. Dissolved oxygen levels have increased, biological oxygen demand has decreased, and nitrate concentrations have dropped in the Ganga, resulting in an improvement in overall water quality in just two months of lockdown [11].

Farmers were caught off guard by the nationwide shutdown, which occurred during the *rabi* (winter) agricultural harvest season. The lockdown resulted in a manpower and equipment scarcity, as migrant labourers in India tend to migrate to rural areas during harvest, and smallholder farmers frequently rent harvesting equipment rather than buy it. Farmers have been unable to harvest their bumper cereal and oilseed crops this season as a result. Crops have been abandoned in some regions, while harvests have been delayed by more than a month in others, with scarce and more expensive labour. Furthermore, despite having more than three times the minimal operational buffer in storage, India's food bank was considered to have a major supply and access concern. Long supply chains have been seriously harmed, particularly when transportation was banned at the start of the lockdown. Trucks loaded with produce were abandoned in the middle of interstate highways by drivers. Because food rotted in transit or never made it to the point of sale, markets eventually ran out of supplies.

The Indian food system was able to combat the pandemic because to large buffer supplies of rice and wheat, which were augmented by a record harvest in the 2019–20 crop season [13,14]. Although the COVID-19 problem is not permanent, it has highlighted the vulnerabilities in India's food system. Taking stock of the concerns can assist governments and corporations in developing better, more resilient supply chains as well as initiatives to assist smallholder farmers, who are important to the food supply chain.

2. RESPONSE TO FOOD SECURITY DURING THE COVID-19 PANDEMIC

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and associated

mitigating actions are having an unprecedented impact on people's lives and livelihoods. Existing nutrition issues have been exacerbated by pandemic-related economic and food system crises, which disproportionately affect the most vulnerable – women of reproductive age, small children, adolescents, and the elderly — notably in low- and middle-income countries (LMICs) [15]. In 2019, 690 million people were malnourished, 2 billion were food insecure, and 3 billion could not afford a healthy diet, with 144 million children under the age of five stunted, 47 million wasting, 38 million overweight, and at least 340 million suffering from micronutrient deficiencies [16]. In the absence of effective response, projections show that COVID-19 and the resulting economic slowdown might result in an additional 9.3 million children wasted, 2.6 million stunted, and 168,000 child fatalities in LMICs by 2022. According to the World Bank, COVID-19 might result in an increase of 83 to 132 million undernourished adults and 88 to 115 million people living in extreme poverty.

Food insecurity, poor diet quality, micronutrient deficiencies, and other kinds of malnutrition are all the result of fundamental, complex, and dynamic changes in our food system [17]. Despite differing costs and mitigating measures to SARS-CoV-2 around the world, the effects on national, regional, and local food systems have repeatedly resulted in job losses, income shortfalls, and food shortages. Lower demand for perishables, limited transportation and storage capacity, and retail food price volatility have all contributed to increases in food waste in various LMICs. Due to conflict, weather extremes, and plague, these disruptions exacerbate existing imbalances in food availability and emphasise the fragility of food systems [18]. Given their vulnerability to external shocks, limited financial resources, and poor public service provision, most LMICs are unprepared to deal with the COVID-19 pandemic and its effects.

Backlogs in processing have resulted in unprecedented food loss and commodities supply changes [19]. Although current projections suggest that staple crop production (rice, wheat, maize, lentils, and soybeans) will be relatively unaffected by the pandemic, the same cannot be said for high-value, labor-intensive, and perishable crops like fresh fruits and vegetables, as well as animal-sourced commodities [19]. This condition will make it even more difficult for disadvantaged families to afford a balanced diet. There was a supply shock

in markets due to market closures and restrictions, especially in the early stages of the pandemic. There was also a demand shock due to lack of purchasing power due to job losses and income losses, and a decrease in demand from small businesses (SMEs) [20]. Market-seeking behaviours such as hoarding and panic buying are further affected by actual or perceived consumer concerns about food supply, which could have devastating long-term effects on diet quality and malnutrition [21]. This can include increasing the consumption of low-cost calories, reducing or eliminating more expensive and nutrient-dense foods, or reducing the number of meals, all of which can result in very poor-quality diets, micronutrient deficiencies, and increases in maternal and child undernutrition or overweight/obesity [22].

The COVID-19 pandemic, according to Headey and Ruel [23], "has all the makings of a perfect storm for worldwide malnutrition." Low or non-existent revenues are expected to lead to a decrease in nutritional intake and diversity, as well as the freezing of feeding programmes. The poorest people are likely to respond to the crisis by buying the cheapest calories they can find. According to Headey and Alderman [24], calories from nutrient-dense, non-staple foods like eggs, fruit, and vegetables might be 10 times more expensive than calories from rice, maize, wheat, or cassava in low-income nations. From farm to fork, the epidemic has generated multiple bottlenecks. Longer lead times (due to social distancing protocols) among distributors, reduced labour capacity, increased inspections and quarantine measures, and rising operating costs have all been seen as pandemic-related effects in domestic supply chains made up of micro, small, and medium enterprises (SMEs), which are largely responsible for supplying food consumed in LMICs [25].

As the number of people infected with COVID-19 rises around the world, agri-food supply systems are expected to be severely impacted. Despite the fact that there may be enough food in the supply chains at the start of the crisis, panic-buying by the public, who anticipates supply shortages during lockdowns, causes an imbalance in food supplies. This imbalance may emerge as a result of agriculturists being unwell or as a result of market disruptions caused by virus-containment methods. Reduced demand as a result of lower purchasing power will influence manufacturers' capacity to invest in their products, thus depleting food supplies. Despite rapidly spiralling food prices following the

COVID-19-induced lockdown, Cariappa et al. [26] concluded that there was no evidence of structural rupture signalling agro-system convergence and resilience in Indian agriculture. Food usage is influenced by people's absorptive capacity, which is limited by incomes and health standards that have been harmed by the COVID-19 epidemic. The ordinary man's ability to acquire and absorb nutritious food has deteriorated as a result of increased health difficulties caused by novel coronaviruses, comorbid illnesses, and seasonal diseases such as dengue fever and the common flu. Unaffordable non-grain retail pricing and a reduction in purchasing power forced the average person to focus on calories rather than nutritious energy. People were limited in their culinary preferences due to local customs and traditions. However, the fight against the Pandemic COVID-19 continues unabated. To live with a new normal imposed by the epidemic, which necessitates a total change in social behaviour and approach to living, we need new economic norms as well as structural, administrative, and legal reforms. The government recently passed three laws to deregulate agricultural markets, encourage contract and corporate farming, and allow private warehouses unlimited bulk storage of key commodities. However, no legislation protecting migrant workers' social security has yet been passed.

Farmers see these new ordinances as tools of protection and incentives for private trading enterprises, all in the name of ensuring agriculture produce procurement at the minimal support price. Their fears of exploitation and enslavement by a market slanted in favour of private trade and against peasant farmers are not entirely unwarranted. The agriculture produce market in peasant farming, as in India, is not perfect to be entirely deregulated, and farming units are too tiny to negotiate with private traders profitably. In a catastrophe like the pandemic COVID-19 that has engulfed the country, deregulation runs against the underlying requirement for effective control and management of food stocks.

3. IMPACT OF COVID-19 ON THE AGRICULTURAL SECTOR

Agriculture is the backbone of many developing countries, providing income to over 1 billion people around the world. The pandemic's prevention tactics are obstructing the production

and transportation of agricultural products. Agricultural production is a long process that entails effort at numerous phases, from planting to nurturing to harvesting to commodity export. As a result of their reliance on market value chains, the food and agriculture sectors are deemed less resilient. Travel restrictions established by governments around the world to combat the spread of the corona virus have impeded these efforts. Agriculture is a high-input sector. In agricultural systems, the reliance on each factor of production can vary dramatically, exposing farmers and planters to increases in input costs. These are the result of a variety of causes, including clogged ports or highways, delays in customs clearance, transportation disruptions, a scarcity of financing, and rising interest rates and capital prices, all of which can lead to higher input costs. These added expenditures make agricultural product production less economical, perhaps resulting in a large loss for farmers. Even once agricultural activities are allowed to resume, it is anticipated that the decline in food grain production in India during the lockdown period will be as high as 23% [27]. (i.e., exemption from lockdown restrictions). Due to the global economic slump, uncertain wages and lower purchasing power, labor/manpower scarcity, and limits on local, imports, and exports, the stability of food availability and access has proven to be precarious. Food nationalism has resurfaced as a result of the outbreak. Because of the interruptions in food supply chains, wholesale food supplies have become cheaper, while retail prices have risen for consumers (FSCs). Uncertain supplies and a scarcity of inputs have increased the cost of production even for future productions.

Reduced agricultural activity and supply chains have resulted in a 10% reduction in vegetable, fruit, and oil supply in India, with no effect on prices [28]. Migrant labourers who work in seasonal harvesting activities have been greatly impacted by the shutdown. While lower agricultural activity might have a substantial impact on overall agricultural productivity, transportation constraints would complicate supply chain management much more. Though legislation and regulations vary by state, any imbalance in agricultural production would have an impact on the demands of other states in the country. Many persons are involved in the intermediate processing of agricultural products from the farmer's field to customers, making it impossible to quantify the exact supply-demand

pattern. Multiple stakeholders with a long supply chain management are always difficult to manage in the event of a future pandemic. To improve the overall resilience of the system, adequate tools for mapping and optimising supply chain management should be developed. In addition, we must establish explicit systems for assessing the short- and long-term impacts of agricultural water consumption. It is important to encourage the small farmers who produce 40 percent of India's food grains to increase their farming productivity by implementing resilient agricultural practises such as adaptation to climate change, landscape protection, and biodiversity maintenance. This will simplify the complex supply-demand pattern in India.

The floriculture industry in India has been severely harmed as a result of the imposed lockdown, which coincided with the traditional marriage and religious celebrations, both of which rely heavily on flowers. As a result of the reverse migration of labourers across the country, *Rabi* (winter) crop harvesting and *Kharif* (summer) crop sowing have also been severely affected. The virus's spread to rural areas will have far-reaching consequences that might stymie production, marketing, and harvesting. In comparison to urban instances, the rural infection rate has remained relatively low. However, if the illness spreads to rural areas or the containment measures have an adverse effect on productivity, there will be serious consequences. As a result, the expansion of the pandemic to rural regions may exacerbate food scarcity [29].

4. ENVIRONMENTAL EFFECTS OF COVID-19

The COVID-19's global disruption has had a number of consequences for the ecosystem and climate. Air quality has improved in many cities, and water pollution has decreased in several parts of the world, as a result of movement restrictions and a considerable slowdown in social and economic activities. Furthermore, increased use of personal protective equipment (e.g., face masks, hand gloves), their haphazard disposal, and the development of a large amount of hospital trash have significant environmental consequences. COVID-19 has both positive and negative environmental effects, as seen in Fig. 1.

5. REDUCTION OF AIR POLLUTION AND GHGS EMISSION

As enterprises, transportation, and companies have closed, greenhouse gas (GHG) emissions

have dropped dramatically. Vehicles and aeroplanes are thought to be major producers of emissions, accounting for around 72 percent and 11 percent of the transport sector's GHG emissions, respectively [30]. The global steps made to limit the virus are having a significant impact on the aviation industry. Many countries have imposed entry and exit restrictions on international travellers. Commercial aviation firms are cancelling worldwide flights due to a decline in passengers and regulations. For example, owing to the pandemic, China reduces its leaving flight capacity by about 50–90% and domestic flight capacity by 70%, compared to January 20, 2020, resulting in a reduction of nearly 17% of national CO₂ emissions [31]. Furthermore, the COVID-19 pandemic is said to have reduced worldwide air travel by 96 percent compared to the same period last year [32], which has long-term environmental consequences.

The European Environmental Agency (EEA) estimated that NO₂ emissions in numerous European cities, including Barcelona, Madrid, Milan, Rome, and Paris, would reduce by 30–60% as a result of the COVID-19 lockdown [33]. When compared to previous years, NO₂ levels in the United States fell by 25.5 percent over the COVID-19 period [34]. The level of NO₂ in Ontario (Canada) has decreased from 4.5 parts per billion to 1 part per billion [35]. In the Brazilian city of Sao Paulo, NO₂ levels dropped by up to 54.3 percent [36]. The levels of NO₂ and PM_{2.5} in Delhi, India's capital, were also lowered by over 70%, according to the report [37]. During the nationwide shutdown in India, there was a 46 percent and 50 percent reduction in PM_{2.5} and PM₁₀, respectively [38]. Evans [39] also predicted that the pandemic will result in a reduction of 1,600 metric tonnes of CO₂, or around 4% of global CO₂ emissions in 2019.

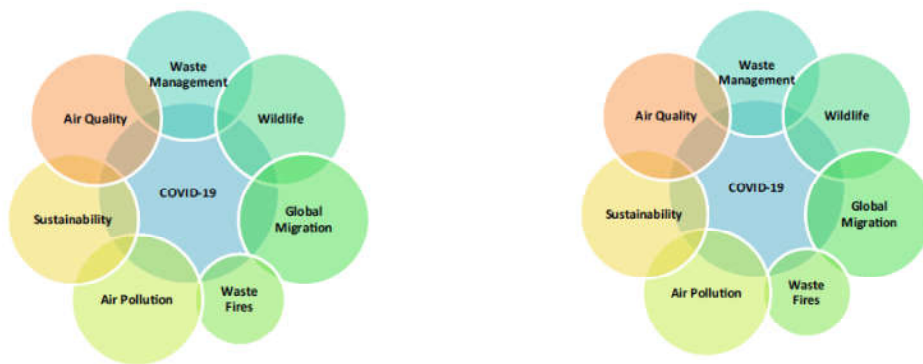


Fig. 1. Coronavirus pandemic (COVID-19) and its environmental Impacts

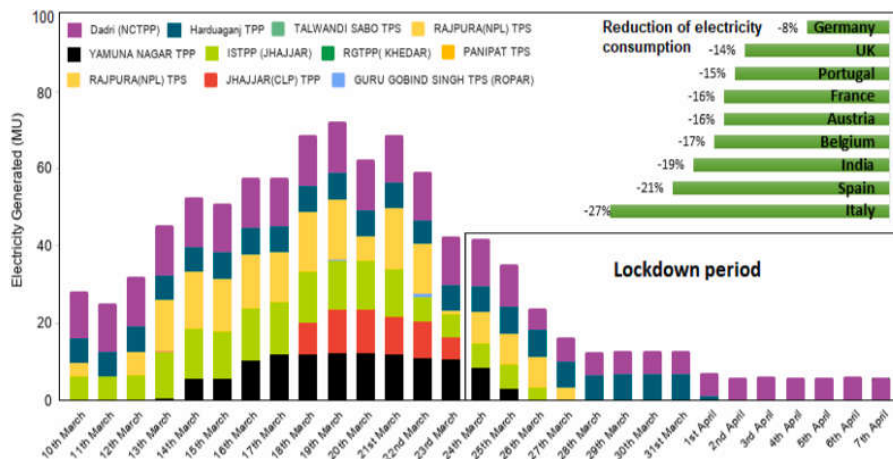


Fig. 2. Coal based electricity generation scenario before and after lockdown in the periphery of Delhi, India, along with total electricity consumption reduction in some selected countries (sources: Armstrong, [40]; CREA, [41])

In the post-lockdown phase, the limits imposed on the transportation sector, industrial, and commercial operations resulted in considerable reductions in important air pollutants (PM₁₀, PM_{2.5}, and NO₂). In comparison to the pre-lockdown period, PM₁₀ and PM_{2.5} levels were reduced by 55.01 percent and 49.34 percent, respectively, during the lockdown period. Because transportation accounts for 80 percent of NO_x in Delhi, transportation restrictions resulted in a 60.11 percent reduction in NO₂ during the lockdown phase (Fig. 3). However, because the main source of SO₂ in Delhi is power plants that remained active during the lockdown period TERI, a minimal reduction of 19.51 percent in SO₂ levels was reported during the post-lockdown phase. The following factors contributed to an increase in O₃ concentration of 37.35 percent in the post-lockdown phase. First, because the emission of O₃ precursors (i.e. NO_x and volatile organic compounds (VOCs)) was greatly reduced during the lockdown phase, O₃ levels may rise [42,43]; second, O₃ reacts with nitrogen oxide (NO) and is degraded by the titration process as follows: $\text{NO} + \text{O}_3 = \text{NO}_2 + \text{O}_2$. Third, as summer approaches, the temperature has begun to rise, from a minimum and maximum temperature of 15°C and 27°C on 1 March 2020 to 24°C and 40°C on 15 April 2020, resulting in an increase in O₃ concentrations; finally, as summer approaches, the temperature has begun to rise, with a minimum and maximum temperature of 15°C and 27°C on 1 March 2020 to 24°C and 40°C on 15 April 2020, resulting in an increase in O₃ concentrations.

6. REDUCTION OF WATER POLLUTION

Domestic and industrial pollutants are discharged into rivers without being treated, resulting in water pollution in India [8,44]. During the shutdown, big polluting industries shrank or shut down entirely, reducing pollution levels [8]. Because of the lack of industrial pollution during India's lockdown, the rivers Ganga and Yamuna, for example, have acquired a high level of cleanliness. The water from 27 of the river Ganga's 36 real-time monitoring stations exceeded the allowed limit, according to the findings [45]. The rapid drop in tourist numbers, as well as a 500 percent reduction in sewage and industrial effluents, were attributed to the improved water quality in Haridwar and Rishikesh [46]. The river Ganga's physicochemical parameters, such as pH (7.4–7.8), dissolved oxygen (DO) (9.4–10.6 mg/L), biochemical oxygen demand (BOD) (0.6–1.2

mg/L), and total coliform (40–90 MPN/100 mL), were found to be within the surface water quality standard of India, according to real-time water quality monitoring data from the Uttarakhand Pollution Control Board [47]. All other indicators, with the exception of total coliform in some monitoring stations, meet the national drinking water quality requirement, which can be used without conventional treatment but only after disinfection (Class A) [48]. It was also shown that during the lockdown, the concentrations of pH, electric conductivity (EC), DO, BOD, and chemical oxygen demand (COD) in different monitoring stations decreased by around 1–10%, 33–66%, 45–90%, and 33–82%, respectively, in contrast to the pre-lockdown period [49]. However, industrial water use has decreased, particularly in the textile sector around the glove [50]. Typically, massive amounts of solid waste are generated during the construction and production processes, resulting in water and soil pollution, which must be reduced. Furthermore, as a result of the reduced export-import industry, the global movement of merchant ships and other vessels is reduced, reducing emissions and marine pollution.

7. COVID – 19 AND Environmental Sustainability

All of these environmental repercussions are expected to be short-term. As a result, it is past time to devise a sound strategy for long-term gain and sustainable environmental management. The COVID-19 pandemic has sparked a worldwide response, uniting us in our fight against the virus. Similarly, a concerted effort by all governments is required to protect this planet, which is the home of human beings [46]. As a result, some potential measures for global environmental sustainability are offered (Fig.4).

Economic, social, and environmental elements of sustainability are all addressed. When combined with the rapid spread of COVID-19, economic outcomes have plummeted, societal problems such as familial violence have grown, and many animal species have suffered as a result of conservationists trapped in their houses [51]. First, the global economic component has been severely hit, as an increasing number of people, particularly those who earn their living on a daily basis, have lost their financial savings. Employers have also taken challenging measures in the face of the pandemic, as they

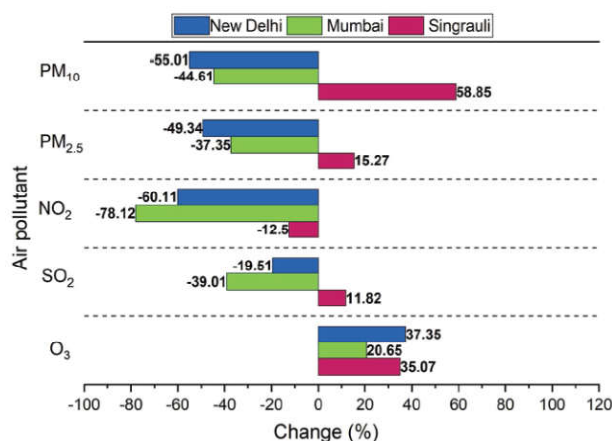


Fig. 3. Percentage change in concentration of *PM*₁₀, *PM*_{2.5}, *NO*₂, *SO*₂ and *O*₃ during pre-lockdown and post-lockdown phases in Delhi, Mumbai and Singrauli



Fig. 4. Proposed strategies of sustainable environmental management

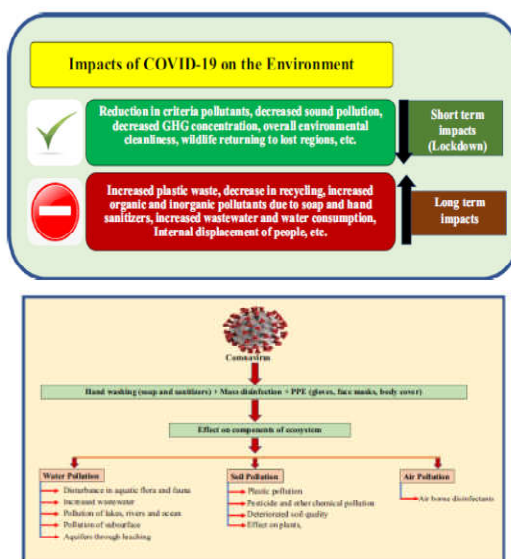


Fig. 5. Cascade effect of Corona virus on different components of ecosystem

risk losing their jobs. During the crisis, many people lost their employment because their companies were unable to pay their wages. Broad businesses such as airlines, tourism, and transportation have sought government assistance in the face of unfavourable consequences. The crisis has also increased the pressure on businesses to strike a balance between efficiency and cost. By switching to a local supply chain, you may reduce your reliance on a widely fragmented international supply system [51]. Although this transition is expected to better meet the requirements of citizens, it may increase production costs. Second, the economic factor magnifies the crisis' impact on societies. Many people have lost their careers and family support as a result of their inability to find a suitable setting for remote work. People who lack the necessary abilities to work from home may be forced to work in product distribution or other similar jobs, putting them in grave danger of becoming infected. Furthermore, the economic disparity has a negative impact on political power. People who are affected by economic inequity are more disturbed, which can lead to feelings of social isolation [52]. As a result, these effects have increased people's perceptions of the crisis and influenced their mental health. Finally, the pandemic's impact on environmental sustainability, as evidenced by the remarkable environmental recovery after the crisis. It is expected that such a rapid change in world nature would be impossible to achieve without the epidemic and its repercussions [53]. The development of effective techniques to boost global nature must be prioritised. Governments must edit, study, and manage open issues in order to choose appropriate ways for both natural recovery and economic development.

8. CONCLUSIONS

The pandemic led crisis has wreaked havoc on both the Indian and global agricultural system. A global food security crisis is in potentially looming that cannot be countered without understanding the impacts of COVID-19 on the agricultural system. Disruptions in supply and/or value chains lead to food wastage unleashing volatility in prices and having implications to food and nutritional security. India has emerged as self-sufficient and a net exporter of food in recent years, the pandemic led chain of events has variously affected the domestic agricultural systems specifically production, marketing and consumption. Provinces with high economic or

agricultural growth faced labour migration and shortage of labour, while states with low growth faced disruption in input supply and risk of infection through exposure to various operations. As the pandemic continues to threaten the global food system, the role of state becomes much more pertinent. In order to protect and safeguard the livelihoods of millions of people associated with the agricultural system, the state should increase spending on social safety nets immediately and take up other short and medium term strategies. Raising revenue by offloading excess buffer stock and increased credit to the agriculture sector should be the top priority for post-pandemic economy restoration.

The concentrations of pH, EC, DO, BOD and COD showed 1-10%, 33-66%, 51%, 45-90% and 33-82% of reduction in pH, EC, DO, BOD and COD concentrations, respectively during the lockdown phase, as compared to the pre-lockdown phase in Yamuna River. The Covid-19 lockdown situation in almost the entire world has shown the importance of nature in our day to day life and gave a true picture of the overexploitation of the natural resources and proved that we are responsible for the degradation of nature and putting risk to our wellbeing as well. The health waste production grows rapidly during the crisis which positions a vital threat to both health workers and the public, if gathered or managed inappropriately. On the other hand, the management of the domestic waste during the pandemic has also raised potential environmental threats. As of now, food accessibility will be severely affected followed by its availability compared to other food security dimensions. In the long term or post-pandemic, food availability could be harshly impacted if no actions have been taken by the concerned. The governments must swiftly plan to enhance their capacity in the agricultural sector by implementing new risk management programs and reforms coupled with insulating the livelihood of people by cash or food assistance programs to meet their basic needs. Hoping that this cloud also has a silver lining, in reshaping the society's potential for greater food security and food sovereignty, thus paving the way to efficient food systems.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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