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Environment, Biodiversity and Soil Security: A New Dimension in the Era of COVID-19

Hassan El-Ramady[1], Abhishek Singh[2], Vishnu D. Rajput[3*], Megahed Amer[4], Alaa El-Dein Omara[5], Tamer Elsakhawy[5], Fathy Elbehiry[6], Heba Elbasiouny[7] and Neama Abdalla[8]

[1]Soil and Water Dept., Faculty of Agriculture, Kafrelsheikh University, 33516 Kafr El-Sheikh, Egypt
[2]Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram, Meerut, 250110 India
[3]Southern Federal University, 344090 Rostov-on-Don, Russia
[4]Soils Improvement Dept., Soils, Water and Environment Research Institute (SWERI), Sakha Station, Agricultural Research Center (ARC), 33717 Kafr El-Sheikh, Egypt
[5]Agriculture Microbiology Department, Soil, Water and Environment Research Institute (SWERI), Sakha Agricultural Research Station, Agriculture Research Center (ARC), 33717 Kafr El-Sheikh, Egypt,
[6]Central Laboratory of Environmental Studies, Kafrelsheikh University, 33516 Kafr El-Sheikh, Egypt
[7]Department of Environmental and Biological Sciences, Home Economy faculty, Al-Azhar University, 31732 Tanta, Egypt
[8]Plant Biotechnology Dept., Genetic Engineering and Biotechnology Division, National Research Center, 12622 Cairo, Egypt

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UNDOUBTEDLY, COVID-19 pandemic is one of the most devastating pandemics in the recent era and major problem for sustainability of life. This virus has severely impacted both environmental and human health. Moreover, it has become the top priority among other challenging global issues including pollution, climate change, urbanization, and unsustainable consumption, which have led to major environmental disturbances and biodiversity loss. The COVID-19 may have long-lasting impacts on the environment health, biodiversity, and soil security, consequently, will raising several scientific questions to be investigated in near future including the expected environmental impacts of COVID-19 on soil, water and air, connecting the missing links between environmental pollutions and COVID-19. Most importantly, unraveling the role of soil in spreading or reducing transmission of the COVID-19 pandemic, and soil xenobiotics status under the COVID-19 outbreak. Understanding theprojected management scenario of soil and freshwater pollution in the post-COVID-19 era and the potential impact of COVID-19 on food and soil security would be of immense aid in the preparation of future pandemics. This opinion article aims to analyze and foresee some of the major issues for meeting the United Nation's Sustainable Development Goals.

Keywords: Environmental issue; Coronavirus; SARS-CoV-2; Soil health; Soil quality; Food Security; Sustainable Development Goals

*Corresponding author: E-mail: rvishnu@sfedu.ru
Authors' Emails: hassan.elramady@agr.kfs.edu.eg; intmsc.abhi@gmail.com; megahedamer3@gmail.com alaa.omara@yahoo.com; drelsakhawyg@gmail.com; fathyelbehiry@gmail.com; hebaelbasiouny@azhar.edu.eg; neama_ncr@yahoo.com
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1. Introduction

It is well known that the COVID-19 (corona virus disease-2019) outbreak is caused by a highly pathogenic novel coronavirus SARS-CoV-2 (Daverey and Dutt, 2020). This virus attacked and penetrated all aspects of our life including human health (Anser et al. 2020; Celis et al. 2020; Hagerty and Williams 2020; Mahmood et al. 2020), our daily routines (Ali et al. 2020), and all environmental compartments such as soil (Conde-Cid et al. 2020; Lal et al. 2020a, b), water (Langone et al. 2021), air (Berman and Ebisu 2020; Anil and Alagha 2020),crop productivity (Yao et al. 2020; Zhou et al. 2020), environment (Lokhandwala and Gautam 2020; Espejo et al. 2020; Juan-Reyes et al. 2021; Mohan et al. 2021) as well as the social, economic, environmental and energy domains (Mofijur et al. 2021). This virus also impacted nearly all sectors on which our life depends including agriculture (Lal 2020; Meine 2020), industrial production (Adnan and Nordin 2020), tourism (Sigala 2020; Škare et al. 2020), economic sector (McElwee et al. 2020; Elliott et al. 2020; Karmaker et al. 2021) and other human activities (Nakajima et al. 2021).

There is a very close relationship between the environment and COVID-19 as described by several recent reports (Wu et al. 2021), the transmission of COVID-19 in the environment (Juan-Reyes et al. 2021), the conceptual model illustrating the complex interactions of the coupled environment-human-system amid COVID-19 crisis (Sarkar et al. 2021),the global environmental changeunder COVID-19 pandemic (Barouki 2021), the complexity of the interplay between COVID-19 and obesity (Hill et al. 2021), the increased plastic environmental pollution rate due to COVID-19 pandemic (Patrício Silva et al. 2021), the impact of COVID-19 on environmental pollution levels particularly air pollution (Liu et al. 2021; Mostafa et al. 2021). One of the most important environmental issues is the biodiversity of soils and plants (Platto et al. 2021). Some reports suggestedthat the lockdown due COVID-19 pandemic has created an improvement in the conservation of the biodiversity and ecosystems services (Bates et al. 2020). The relationship between the COVID-19 outbreak and animal biodiversity requires urgent attention to protect both wildlife and human health (Fang et al. Song 2021). Roe et al. (2020) suggested that the COVID-19 crisis has provided a unique opportunity for a paradigm shift both in the global-food system and also in wildlife conservation due to its trade-banning.

Therefore, this review highlights the concerns in the post-COVID-19 era and its relationship with the environment, biodiversity, and soil security. Thereare several knowledge gaps concerning the impact of COVID-19 on the previous three issues such as what the links between COVID-19 and soil biodiversity.The expected environmental impacts of COVID-19 on soil security and its status under the COVID-19 outbreak.

2. The novel coronavirus (COVID-19) and its impact on the environmental pollution

A novel coronavirus (COVID-19) was reported for the first time in December 2019 in Wuhan city, Hubei province of China before its global footprint. On January 30, 2020, the World Health Organization (WHO) declared a worldwide public health emergency and because of its infection and spreading rate and on March 11, 2020, it was declared as a global pandemic.The global lockdown had various positive impacts on the environment like improving the air and water quality and negative impacts like increase in biomedical and plastic waste due to excess use of face masks and personal protection equipment's (Shammi et al. 2021) (Fig. 1).

The agingpopulation suffered high fatality ratecompared to the relatively younger population. Starting in March 2020, the epidermic disease swelled into a pandemic condition, by end of March 2020, half of the world population was undergoing different categories of lockdown (Muhammad et al. 2020). In April, 2020, around 2.1 million active cases were reported globally and more than 135,000 people suffered fatal outcome (WHO, 2020). As soon as the lockdown was imposed by various countries, the industrial activity, all means of transport were also closed which restricted the movement of people. Due to the shutdown of all these activities, air pollution went to its lowest level in the world because gases emanating from industries and vehicles are the main causes of air pollution (Arora et al. 2020). All industrial activity was restricted during the lockdown, due to which no pollutants were leached into the river Ganges in India, resulting in increasing the dissolved oxygen content in the Ganges water from 3.8 mg/ml to 6.8 mg/ml, which is an increase by 79% (Arora et al. 2020). During the lockdown, noise pollution also decreased, due to which the movement of wild animals, and birds also started in the areas of human habilitation (Basu et al. 2020).

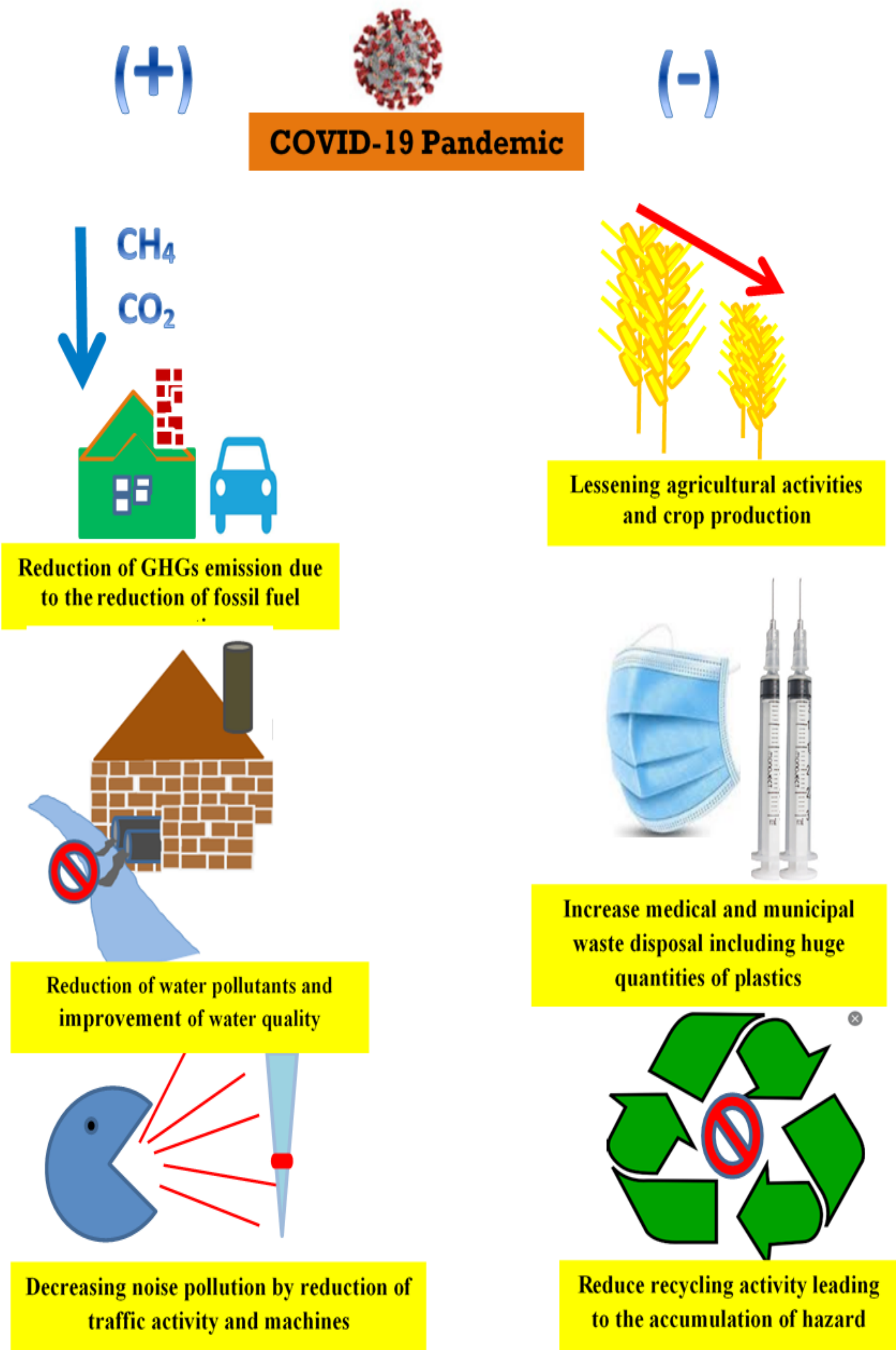

Fig. 1. Positive (+) and negative (-) effects of COVID-19 pandemic through different pathways in the environment including improving the quality of air and water, but accumulation of wastes due to reduced recycling activities

2.1 Impact of COVID-19 lockdown on global air pollution

When the COVID-19 pandemic began human activities such as commercial, education, industrial, traveling and other sectors were limited because of the safety measures. This is a significant incident that reduced various types of environmental pollution globally. Before the COVID-19 pandemic, the global population suffering from ahigh level of urban pollutants especially air pollution (i.e., CO_2, SO_2, NO_2, O_3) which are emitted from different types of urban sources, viz. industries, transport vehicles, and other technogenic activities. The main air pollutant is nitrogen dioxide (NO_2) which is produced by the combustion of fossil fuels used by industry and transportation, reduced at a very low-level 20% during the global lockdown (NASA 2020). In the year 2020, the carbon emissions rate sunk dramatically due to lockdown. All the commercial actives were shut down and the European Union (EU) expected a higher reduction in greenhouse gases emissions in 2020 as compared to 2019(EIA2020)

2.2 Impact of COVID-19 on greenhouse gases

Greenhouse gases (GHG) like carbon dioxide, methane, and nitrous oxide emission rate were on an upward trajectoryduring the last few decades. For control of emission of these global warming gases, first world countries signed the Paris Agreement. The main aim of this agreement is to reduce the emissions of pollutants generated through the burning of fossil fuels. The major impact of these greenhouses is trapping heat close to the earth's surface leading to an increase in the earth's temperature. Global warming threatens global food supplies, increases the chances of tropical storms and heatwaves, and the risk of flooding due to sea-level rise.

Worldwide the major contributor of GHG load is the transport sector and during the lockdown crisis, this sector waspredominantly affected. Traveling passengers are declining as a result of international travel restrictions, and reduced commuting, tourism, and business travel. COVID-19 pandemic affected worldwide 2.6 billion people and constrained their pace in their respective nation. In the transport sector, the most affected sector is road transport, according to International Road Transport Union (IRU) 57% of road transportation activity decline in 2020 as compared to 2019 (Conticini et al.2020). International Air Transport Association (IATA) data for air transport has shown a 65.2% decline in air passenger kilometers in Europe during July 2020 compared to the same period in 2019, this data shows a significant decline in GHG emissions from transport in 2020 (EEA 2020). The primary assessment of the International Energy Agency (IEA) shows that during the lockdown global energy demand could fall to around 6% in 2020. This influences the 20% renewable energy of the EU. The reduction in environmental pollution has been noted in countries of America, Europe, India, Myanmar, Nepal, Sri Lanka, Pakistan, Bangladesh, and China (Dentener et al. 2020).

During the lockdown industrial production units were shut down thus utilization of electricity also reduced because of all these reasons, the power grid had to produce less electricity, and coal use in these power grid significantly reduced thereby leading to the reduced carbon emission rate (Financial Times, 2020). In the United States of America (USA) the carbon dioxide emission plunged by 7.5 % in 2020 (EIA 2020). In the European Union (EU) daily emissions of carbon dioxide declined by approximately 58% relative to the pre-crisis level (Financial Times, 2020). According to the Centre for Research on Energy and Clean Air, globally the nitrogen dioxide levels reduced to a record low because its major sources are cars. In February 2020, China reduced consumption of coal, which was equal to the total amount of coal consumed in many small European countries. The air quality in some important metropolitan cities like New Delhi, Los Angeles, and Beijing drasticallyimproved (Kumari and Toshniwal 2020; Wu et al. 2020).

The World Meteorological Organization (WMO) report suggested that the amount of CO_2 was increased by 2.6 ppm from 2018 to 2019, that's why the total increased amount of CO_2 in 2019 was 410.5 ppm. In early 2020 from mid of March, the carbon emissions fell by 17% at their peak, but unfortunately, the overall effect on concentrations has been very small (BBC 2020). During the strict lockdown, when most of the people could not leave their homes at all for about 3 weeks resulting emissions of pollution sharply fell in China, and this type of fall of pollution was never records before. During this pandemic lockdown, the reduction in the air pollutant emissions was huge (Joost de Gouw 2020). Some preliminary data shows that the globalCO_2emission was on a downward trajectory, but this decline was only temporary (Quéré et al. 2020). In China, during the COVID-19 pandemic, all commercial activities were restrictedand in early February and Mid-March of 2020, leading to rapid decline in coal consumption as much as 18% (NG 2020). In this way due to pandemic, the world's largest emitter of carbon encumbered250 million metric tons of carbon pollution which is equivalent to more than half the annual carbon emissions of the United Kingdom (CNN 2020). Italy is one of the nations which mainly uses natural gas to generate electricity and during the lockdown, power supply-demand was also reducedby 27% in early March (NG, 2020).

2.3 COVID-19 and plastics waste pollution

The COVID-19 pandemic has caused significant changes in the production and consumption of plastics and thus caused amplification in plastic waste. The pandemic led to a rapid increment in the global demand for personal protective equipment(s) (PPE), such as gloves, masks, gowns, sanitizers, and face shields (Shammi et al. 2021). During early efforts to curb the spread of the virus, the World Health Organization (WHO) estimated that 89 million medical masks per month were required globally, in addition to 76 million examination gloves and 1.6 million sets of goggles (WHO, 2020).In European and Asian countries most of the restaurants were closed for on-site dining, but many food joints offered take away and delivery services using single-use plastic containers. Several large refillable retailers' goods services like coffee, and drinking water stopped allowing customers to bring refillable containers, beside they used disposable cups and containers. Meanwhile, online shopping outlets have seen a sudden growth in demand, with many products packed in single-use plastic. While disposable plastic products have played an important role in preventing the spread of COVID-19 in the shorter term, the upsurge in demand for these items may challenge EUs efforts to curb plastic pollution and move towards a sustainable and circular plastics system. The production, consumption, and disposal of additional single-use plastics will have a greater impact on the environment and climate, such as increased waste generation leading to air pollution and GHG emission. Also, the risk of littering may add more risks to society. In addition to the direct effects stemming from increased demand for single-use plastics, other factors related to the pandemic should be noted. Reduced economic activity has seen sharp decline in the global oil prices. In turn, this has made it significantly easy and cheaper for manufacturers to produce plastic goods from virgin, fossil-based materials rather than using recycled plastic materials. In the current time of the pandemic, the economic viability of the European and global plastic recycling market is under significant pressure. Lower market demand for recycled plastics has also complicated the efforts of many local municipalities to manage their wastesin a sustainable fashion, with less desirable waste-disposal methods.

2.4 Impact of COVID-19 on crop production

Recent reports on the effect of the minimum emission rate of air pollution during the pandemic time of COVID-19 lockdown on crop production, during this time higher wheat yields were recorded in South Korea and China. While, in the European (EU) countries like in northern EU, 2-3% and Southern EU up to 7% increase in the yields were noted, this was mainly caused dueto changes in ozone layer (JRC, 2020). This study was done with the help of the Tropospheric Monitoring Instrument (TropOMI) on the Copernicus Sentinel-5 Precursor satellite which analyzed the observations of the global nitrogen dioxide (NO_2) emission (Dentener et al., 2020). During Marchto May 2020, the Copernicus Sentinel-5 Precursor satellite recorded a decline in the NO_2concentration from 30% to 10% in Europe, North America, and Asia, this wide range of drop-in $NO_2$was directly linked to the huge drop in the inland transportation, industry and power generation, shipping, and aviation during the lockdown (Dentener et al., 2020). TM5-FASST (FAst Scenario Screening Tool) model is used for observations of NO_2 emissions and its impact on O_3 concentration, this tool also calculated a yield improvement ranging from 2% to 8% as a consequence of the lockdown-related ozone reduction (JRC, 2020).

Ozone is a highly reactive molecule containing three oxygen atoms that occur naturally in small amounts. The stratospheric ozone layer, which is roughly 7 to 25 miles above Earth's surface, absorbs harmful ultraviolet radiation that can damage plants and animals and can cause cataracts, skin cancer, and suppressed immune systems in humans. Some specific chemicals for example chlorofluorocarbons which are mainly used in refrigeration, fire extinguishers, and as spray-can propellants are known as ozone-depleting substances (ODSs), directly causing ozone depletion leading to the formation of ozone hole (Baldwin et al. 2020). Later, other ODSs were also discovered viz., hydrochlorofluorocarbons (HCFCs), Methyl chloride, and other forms of halones (Arora et al., 2020). However, during the lockdown, huge reduction in the use of these ozone-depleting substances was observed. Changes in climate pollution due to the COVID-19 is not permanent, however, it provided a strong base for the formulationof new policies and rules to reduce these pollutants from the environment for sustaining humanand environmental health.

3. Biodiversity during COVID-19

The rapid degradation of biodiversity and ecosystems over the last 50 years has put tremendous pressure on natural systems that provide humanity with food, water, and other natural resources (Rodrigo-Comino et al. 2020). This degradation is directly connected to the land-use change, climate change, invasive foreign species, direct misuse of wild species, and pollution. The rapid expansion of the global economy over the past half-century has led among other factors to indirect effects such as extensive habitat destructions, which is also linked to the appearance of new viral diseases, such as COVID-19. This degradation also poses major threats because of its ability to damage the natural resources whereupon several economic activities depend on (Keswani, 2021; 2019). However, till the emergence of COVID-19, these threats appeared to be remote to many (McElwee et al. 2020). Pearson et al. (2020) reported that the COVID-19 pandemic has the potential to trigger many effects on biodiversity and conservation outcomes. This virus emerged as a result of wildlife overuse and increasing the risk of novel diseases that are related to environmental degradation(Cunningham et al.,2017).Also,the direct and immediate effects of this virus, scientists are sensitized about the emerging infectious diseases and their relations to biodiversity loss, human activities, and sustainability (Corlett et al. 2020). In this context, the negative representation of wildlife as disease carriers may lead to castigatory carnage of probable carries species (e.g., bats and pangolins), resulting in severe reflections for threatened species (Bang and Khadakkar, 2020).

The COVID-19 pandemic has affected all aspects of human life and society (families, friends, and people) around the world. Thus, analyzing its possible impacts on the world's biodiversity and our ability to protect it should be urgently considered. However, it is too early for a definite answer about how the COVID-19 pandemic affected biodiversity. It is suggested that essential conservation works are still taking place. Protected areas and national parks in a lot of places are still being guarded and vulnerable wildlife is still being protected in this hard time. Since some of the conservation scientists have been infected with the COVID-19, field and lab works have mostly shut down, in the same time communications and teaching have moved to virtual platforms, with consequences on data collection, training, and networking. Some scientists and the media reported some cases of decreased human pressures on natural ecosystems, fresher air and water, and wildlife reclaiming disputed habitats (Corlett et al. 2020).

Reasonably, the scientific reports have focused on the explanations and consequences of the pandemic from an anthropogenic point of view. Although immense as the human tragedy surrounding the pandemic is, scientific reports on the impacts of the pandemic on conservation concerns are petite compared to reports on consequences related to society, economy, policy, and health. This is because of the sudden disease outbreak, lockdown, and inaccessibility to fields for starting new experimental studies and monitoring outstanding studies resulting in the absence of a scientific indication on the direct impacts of the lockdown on involved species and ecosystems. However, it is believed that the current pandemic, the consequent lockdown, and the post-lockdown phase until returning to normalcy may have vital positive and negative effects on the conservation of biodiversity (Bang and Khadakkar 2020).

Thus, to be more aware, there is a need for an ambitious agenda for global biodiversity conservation in the post-COVID-era(Dinerstein et al. 2020). The lack of such agendas led to, risingdestruction of the Amazonian rainforest during the lockdown, by 55% in the first four months of 2020 than the same time last year, Caribbean centuries-old coral reefs in Australia were irreversibly damaged due to the lack of treatments against invasive species (e.g., rats that destroy the native species) and fungal diseases on island countries such as New Zealand in the deficiency of extinction efforts (Bang and Khadakkar, 2020). Furthermore, Rondeau et al. (2020) reported that the lockdown evaluations have led to financial crises at wildlife rehabilitation centers and zoos, causing caretakers layoffs and more threatening species such as Orangutan of Borneo. They also stated that the travel restrictions and domestic lockdowns in all countries by the end of April 2020, efficiently halted all tourism. The possibility of a drawn-out loss of income from nature and wildlife tourism (that represent for example more than 10% of the economies of Kenya, Namibia, Tanzania, and South Africa) threatens decades of development work directed to create sustainable community-based conservation sustainable strategies.

On the contrary, a decrease in ecotourism and human attendance may help sensitive species to anthropogenic stress to thrive (Bang and Khadakkar 2020). Corlett et al. (2020) reported the presence of anecdotal reports of declined human stresses on wild species and protected areas regarding the lack of visitors because of travel restriction and lockdown of parks and zoos. They also stated the presence of some reports about wild species adventuring, that have not been seen for long years, into rural and urban areas (including beaches and parks), because of declining traffic and human activities. Moreover, widespread deforestation in the tropics has resulted in humans have become in more direct contact with vector-borne microbes (such as the Zika virus that appeared from mosquito carriers in the Basin of Lake Victoria savanna forests) or via. mammalian carriers that act as viral hosts (such as HIV that emerged from primates in the Northeast Congolian low-lying forests). Thus, it is important to achieve the area-based targets for protecting all remaining undamaged and semi-undamaged terrestrial habitats to be an effective solution to diminish contact zones, help to limit the chances of zoonotic diseases that affect humans in the future (Dinerstein et al. 2020). In this context, conserving the global safety net could care for public health by decreasing the potential emerging of zoonotic diseases such as COVID-19 in the future (Dinerstein et al. 2020). Hence, guide efficient conservation strategies should be adopted from such events by the intergovernmental organizations and national governments to safeguard biodiversity and human health during the COVID-19 recovery phase (Pearson et al. 2020). Moreover, it is required to improve shepherd's awareness of ecosystem services, particularly in the present condition of COVID-19. The governments should keep the safety line between humans and wild animals and take on suitable strategies to manage the conflict between wildlife protection and animal husbandry production (Cai et al. 2020).

The UN Food and Agriculture Organization's (FAO) was tasked by the UN Convention on Biological Diversity (CBD) to prepare a report on global soil biodiversity. On December 4, 2020 on the occasion of World Soil Day, the report "*State of Knowledge on Soil Biodiversity: Status, Challenges, and Potentialities*" was released by the FAO and its partners, Intergovernmental Technical Panel on Soils (ITPS), the Global Soil Biodiversity Initiative (GSBI), the Secretariat of the Convention on Biological Diversity (SCBD) and the European Commission.This report focuses on the campaign "*Keep soil alive, protect soil biodiversity*" aiming to raise awareness of the importance of maintaining healthy ecosystems and human wellbeing through addressing the growing challenges in soil management, increasing awareness about soils, fighting soil biodiversity loss and encouraging governments and communities around the world to commit to proactively improving soil health (FAO 2020a).

Concerning the upcoming FAO Global Symposium on Soil Biodiversity, the FAO symposium, "*Keep soil alive, protect soil biodiversity*", will be a fully virtual science policy meeting on 2-5 February 2021 andco-organized by the Global Soil Partnership (GSP), the Intergovernmental Technical Panel on Soils (ITPS), together with the UN Convention on Biological Diversity (CBD), the Global Soil Biodiversity Initiative (GSBI), and the Science-Policy Interface of the United Nations Convention to Combat Desertification (SPI UNCCD). The3rdGlobal Soil Biodiversity Conference will be held duringMarch 2023, in Dublin, Ireland, and will be organized by GSBI.

4. Soil security in the Era of COVID-19

It is well known that humanity needs security for all life aspects including the security of water, soil, food, energy, and the environment. Based on several previous reports, soil security has mainly five dimensions (5 C) including capability, condition, capital,connectivity,an dcodification (e.g., Field 2017; Dazzi and Lo Papa 2019; Bouma 2020; Pozza and Field 2020; Spring 2020). The strong correlation between soil security and biodiversity has been confirmed by Spring (2020), soil security and food security by Pozza and Field (2020), and the soil security and sustainable development agendas by Bouma (2020). Therefore, several developing countries need to seek for the security of their soils to achieve the sustainable development goals in Tanzania (Rashid, 2021), soil organic carbon in Ethiopia (Wolka et al. 2021), and soil fertility management (Martey and Kuwornu2021) particularly under climate change and soil salinity (Mukhopadhyay et al. 2020). A direct impact on soil security could be noticed from the pressures of the COVID-19 crisis on food systems (Poch et al. 2020).

Due to the very strong link between soil security from one side and water security, food security, energy security, and environmental security from the other side, COVID-19 that impacts on these previous securities will definitely impact the soil security.There are several reports addressing the security of water (e.g., wastewater, groundwater, and freshwater) as influenced by the transmission and spreading of COVID-19 (e.g., El-Ramady et al. 2020;Gwenzi, 2021). Food security, which represents a serious global crisis under the COVID-19 pandemic (O'Hara and Toussaint, 2021) has been addressed through different issues such as impacts of COVID-19 on global crop protection through global food security and safety (Lamichhane and Reay-Jones 2021), the response of food-supply shocks to COVID-19 (Huss et al. 2021), impacts of COVID-19 on agriculture and food systems (Huang, 2020; Adhikari et al. 2021), the food industry under COVID-19 (Nakat and Bou-Mitri, 2021). More securities have been handled including the prevention of COVID-19 and social security (Dutta and Fischer 2021; Duhon et al. 2021) andthe security of the internet of medical things, which has been deployed in tandem with other strategies tocurb the spread of COVID-19 (Aman et al. 2020).

As soil is one of the most important agroecosystem components, soil security has a direct and indirect impact on agriculture. The agricultural sector is the main source of the foods of humans and the COVID-19 has had a devastating impact on this sector as reported by several studies (Lioutas and Charatsari2021). These studies included the impact of COVID-19 on the agricultural exports (Lin and Zhang 2020), agricultural sector (Workie et al. 2020), agricultural systems (Kumar et al. 2020), agricultural production (Pu and Zhong 2020), agricultural fire pollution (Morello, 2021), and global agriculture and food sectors (Mishra et al. 2021). This pandemic has significantly affected food systems, particularly agricultural inputs and outputs markets, food processing, and employment along food value chains, which has exacerbated poverty, and food and nutrition insecurity (FAO 2020b). It is estimated that the COVID-19 pandemic globally could add 130 million people suffering from chronic hunger in 2020 (FAO 2020c). The pandemic is still serious and even worsening in some countries while it is currently under control in other countries (Huang, 2020).

As the soil is the main component of food production, help in feeding, there is no production of foods without the soil and the impact of the COVID-19 pandemic may control the global food security through soil healthand its security (Poch et al. 2020). "*The soil is the great connector of lives, the source, and destination of all. It is the healer and restorer andresurrector, by which disease passes into health, age into youth, death into life. Without proper care for it, wecan have no community because without proper care for it we can have no life*" as reported by the American novelist Wendell Berry (Poch et al. 2020).It is expected that the COVID-19 pandemic may re-shape our lives in the future, not only duringthis acute phase but in the post-pandemic world. The soil has crucial rolesthat could be achieved by sustainable soil management in the new global reality, which are imperative for solvingand anticipating the security of global food and nutrition requirements (Poch et al. 2020).

5. Conclusions

During 2020, the COVID-2019 pandemic engulfed the world within a very short time (4 months) with long-lasting impacts on the global economic, social, educational, political, and scientific programs. Humanity as a whole suffered during theCOVID-19 outbreak including travel bans, the territory lockdown, and manyother restrictions, which restricted people's movements and haveseriously affected the global economy. The COVID-19 has positive and negative impacts on the environment and the main question is that will the consequences of these impacts will be continued for a prolonged timeafter this pandemic? Can the impact of COVID-19 on soil security be considered a new dimension besides the known dimensions of soil security? Based on different strategies (i.e., the global, national, and local), soil security is a guarantee for resilience in the face of such crises as COVID-19. Therefore, the EBSS journal seeks to open new windows concerning these very complicated issues including the environment, soil biodiversity, and soil security and their relationship with COVID-19. The expected impacts of post-COVID-19 on these crucial issues will be reflected in global food production. The overall goal of this article is to provide overview on the impacts of the COVID-19 pandemic on various environmental components and to formulate strategies.

Ethics approval and consent to participate

This article does not contain any studies with human participants or animals performed by any of the authors.

Consent for publication

All authors declare their consent for publication.

Contribution of authors

This study was designed and implemented by all the authors, where all contributed to writing the manuscript, interpreting information presented and have read and agreed to the final version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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