

Article Identifier: <https://identifier.visnav.in/1.0002/ijabs-21k-08006/>

Environmental sustainability in the COVID-19 era: Impact and potential techniques of sustainability

B. Egbuchilem, ^{1*} and E. O. Nwauzi ²

¹ Department of geography and environmental studies, Ignatius Ajuru University of education, Port Harcourt, Nigeria

² Department of entrepreneurship studies, Ignatius Ajuru University of education, Port Harcourt, Nigeria

* For correspondence: bonifaceegbuchilem2018@gmail.com

Received on: 8 November 2021

Published on: 2 February 2022

ABSTRACT

The COVID-19 pandemic is a crisis affecting everyone, individual physical work. It is spreading human suffering, infecting the economy and upending people's lives. The drastic measure taken to mitigate the spread of the virus and the shutdown of economic activities has significant impacts on the environment. Therefore, this study intends to examine the positive environmental effects of the COVID-19 pandemic, by taking into cognizance the available scientific literatures. This study shows that, the pandemic crisis significantly improves air quality in various cities across the world including Port Harcourt, Nigeria, reduces GHGS emission, lower water pollution and noise, and reduces or restores ecological system as a result of pressure reduction on the tourist destruction. As the economic activities returns, after the pandemic, there seems to be significant increase in pollution level. Hence, this study also highlights the possible ways to achieve long term environmental benefits. The study suggests among others, green investment approach for economic growth. The proposed techniques if implemented might be helpful for the global environmental sustainability.

Key words: Environmental Sustainability, COVID-19, Pollution, Sustainability and Green Entrepreneurship

1. INTRODUCTION

The pleasant of the surroundings as a effective asset of the society is a priority. It deserved ok safety. The surroundings has been diagnosed

and popular as each an financial and social asset in addition to an agent of development. The productiveness of the herbal surroundings lies with inside the cap potential to guide and enhance human existence [1].

The coronavirus ailment 19 (COVID-19) pandemic of 2020 is one which has affected the arena as a whole, bringing whole structures to a halt in key sectors of the economy, in addition to posing a worldwide fitness disaster which has positioned the whole international populace prone to infection [2].

COVID-19 solves the environmental issues resulting from human/commercial sports thru adoption of renewable power sources, modern and inexperienced practices. The idea don't forget environmental and society to be the important thing stakeholders of the enterprise. Thus, it makes contributions to environmental safety [3]. The pandemic COVID-19 is an eye-opener which targeted at the requirement to reconsider and advanced the concord among guy and surroundings. We can't reflect on consideration on the earth without the technology, merchandise and infrastructure that we've got today, financial sports can't be curtailed for the safety of surroundings. Environment presents guy with many offerings for which guy need to be thankful due to the fact without them human existence can't exist at the earth.

The last purpose of sustainability is to make sure prosperity and environmental safety without compromising the cap potential of destiny generations meets their needs; human beings experience respectable paintings without harming the earth's crucial ecosystems and resources.

To manipulate the unfold of the virus, authorities of maximum of the affected international locations initiated to limitation the

motion of human beings as a safety measure of COVID-19 which starts off-evolved from March 24, 2020 [4]. All businesses besides emergency offerings (e.g. medical, fire, police, meals supply, etc.) are being shutdown to inspire human beings to live at domestic which includes academic establishments and public transport [5]. However, the pandemic has necessitated a massive worldwide socio-financial disruption, which has direct or oblique bearing or effect at the surroundings including development of air and water pleasant, discount of noise and recovery of biodiversity (ecology) [4, 6-7]. After the lockdown, the easy surroundings has been discovered everywhere in the international, now no longer most effective in excessive industrialized international locations, greater in particular in European international locations because of the lock down scenario and the awareness of NO₂ emission with inside the air unexpectedly decreased [8]. Due to worldwide shutdown, we've got brought on financial downtown throughout the arena; however on the opposite hand, in a higher climate, we're gaining a converted international. There isn't any doubt that when the arena financial sports choose up after COVID-19 pollutants and waste will commenced to piling-up in our surrounding, so one can now no longer adverse to the fitness most effective however additionally surroundings sustainability. Hence, with inside the above context, it's miles very critical to undertake inexperienced and green practices in enterprise operations for you to enhance environmental sustainability. However, that is missing for the time being in our company zone and oil companies. This take a look at is consequently meant to analyse the connection

related to COVID-19 lockdown and its impact on surroundings and society in addition to proposed viable techniques as destiny guiding principle for environmental sustainability thru inexperienced transition and economy.

2. COVID-19 AND ITS IMPACT ON THE ENVIRONMENT

The international crises resulting from the COVID-19 pandemic have brought about numerous affects at the surroundings and climate. Studies on environmental effects of COVID-19 have proven that the lockdown and associated measures applied via way of means of authorities of numerous nations, to prevent the unfold of COVID-19 have brought about a

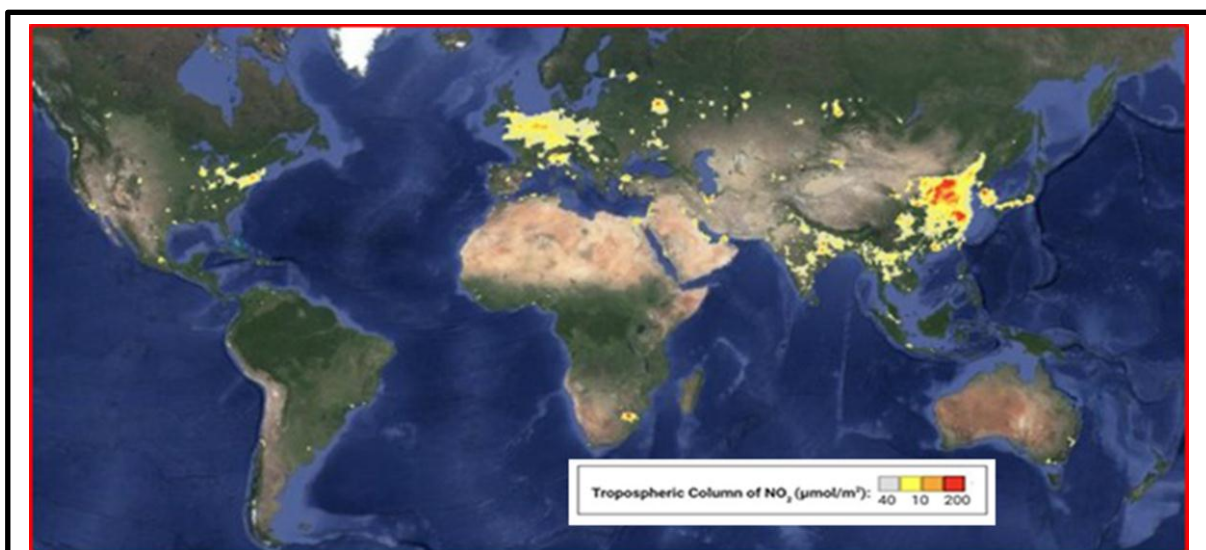


Figure 1. NO₂ levels declined sharply during the lock down globally. Average NO₂ concentrations based on satellite data between March 15-April 30, 2020 (with lock down) [58]

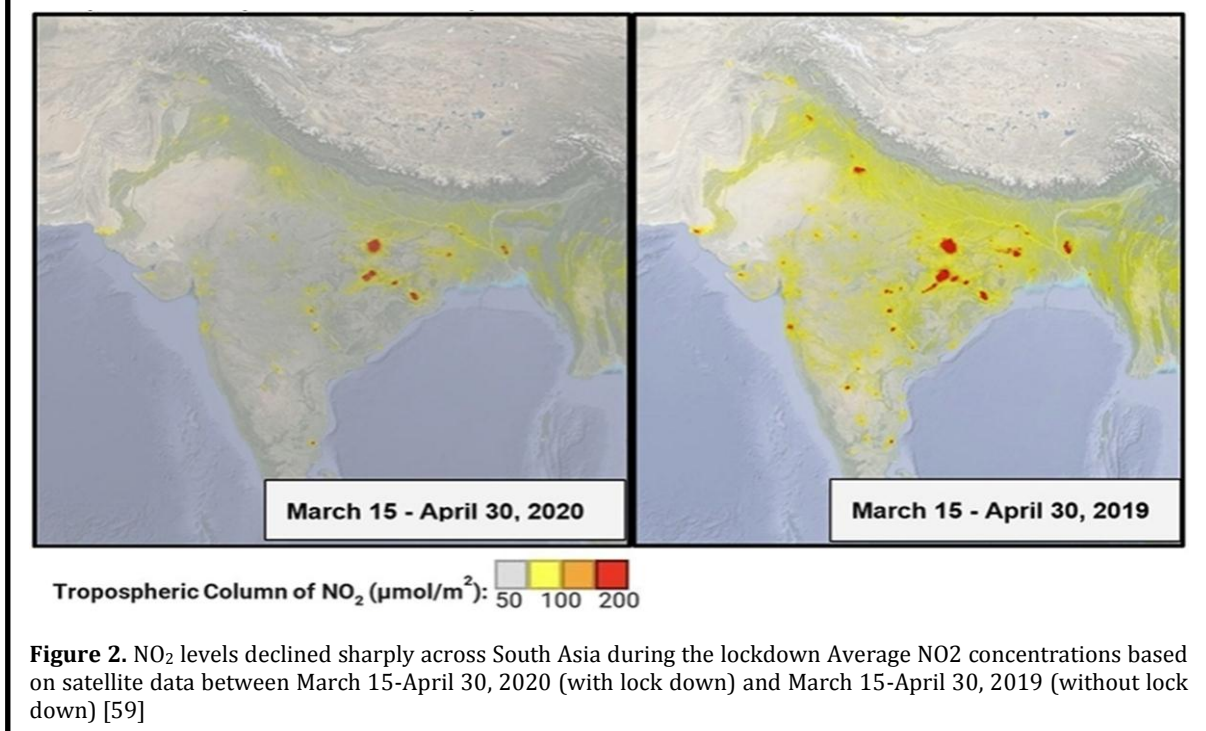


Figure 2. NO₂ levels declined sharply across South Asia during the lockdown Average NO₂ concentrations based on satellite data between March 15-April 30, 2020 (with lock down) and March 15-April 30, 2019 (without lock down) [59]

lower in social and monetary activities, restrict of motion of human beings and drop in avenue transport. Hence, the advanced air is best in lots of cities, briefly cleansing ecosystem with a discount in water pollutants in numerous components of the world.

2.1. Air Pollution and COVID-19 Pandemic

The COVID-19 confinement imposed via way of means of authorities of various international locations has significantly constrained financial sports globally with unplanned impact of lowering air pollutants. Studies have proven that there's a full-size discount in air pollutants because of COVID-19 pandemic lockdown. World Bank (2020), as an example notes: For example, in the course of close down, satellite

for pc statistics of Nitrogen dioxide (NO₂) attention stage display a pointy discounts examine to NO₂ stage in the course of the identical length in 2019 (figure 1&2). Similarly, statistics from sentinel five-p satellite for pc exhibits that common NO₂ tiers in lockdown regions in 2020 for the length March 15 to April 30 had been decrease than tiers in 2019 (Figure 3) for India. These end result may be attributed to drastic discount of vehicular traffic, one of the primary reasserts of NO₂ emission. In addition to air pollutants in the course of lockdown, PM_{2.5} tiers had been decrease in 2020 examine to 2019 in Hubei, India, France, China respectively (figure 4)

The impact of the compelled confinement

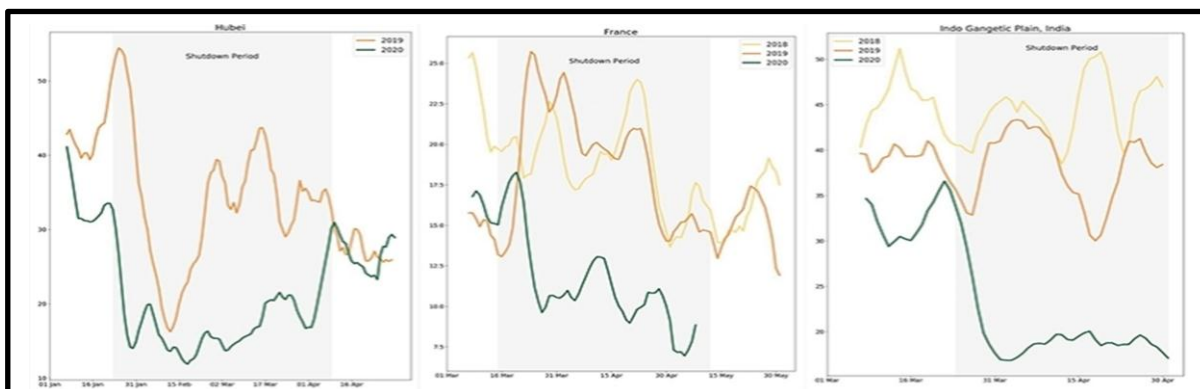


Figure 3. NO₂ levels declined sharply in Hubei (China), France, and IGP (India) during the lock down Daily 7-day rolling average NO₂ concentrations based on ground-level monitors before, during, and after the lock down [60]

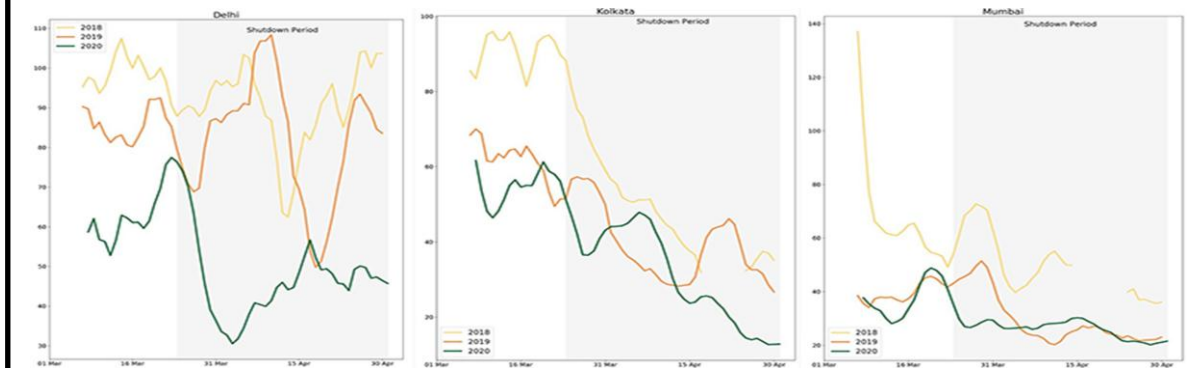


Figure 4. Mixed impact of lock down on PM_{2.5} levels in Indian cities. Daily 7-day rolling average PM_{2.5} concentrations based on ground-level monitors before, during, and after the lock down in New Delhi, Kolkata, and Mumbai [60]

because of COVID-19 in India precipitated discounts in PM_{2.5} and PM₁₀ which account for 46% and 50% average discount [8]. Other research evaluating PM_{2.5} pollutants tiers in the course of lockdown with baseline common additionally observed large discounts in PM_{2.5} pollutants tiers with inside the route of confinement length. For instance, among 10% and 54% discounts in PM_{2.5} pollutants tiers had been suggested in diverse localities in India in the course of national lockdown examine to preceding 12 months of COVID-19 [9-13]. Localities in China additionally witnessed comparable discounts in PM_{2.5} [14-15].

The stage of air pollutants had validated a discount throughout Kazakhstan [16], Brazil [17], India [18], the USA [19]. Similar or decrease discount in air pollutants stage had been additionally suggested in Ecuador and Morocco [20-21].

It is inferred that, amongst one-of-a-kind sectors of economic system automobiles and aviation are key merchandise of CO₂ emissions as such, make contributions nearly 72% and 11% of the shipping area's Green House Gases (GHGS) emission respectively [21]. It is expected that adjustments in each day emissions in the course of the confinement from the COVID-19 pandemic from diverse sectors of economic system in comparison to common emission of GHGS (CO₂) with inside the modern to be had pre-COVID-19. It turned into observed that CO₂ and different GHGS declined significantly because of adjustments in emission stage with inside the one-of-a-kind financial sectors in lots of USA cities.

Worthy to be aware is that measures initiated globally for the mutants of the virus also are having a severe effect at the aviation area as many countries imposed ban on global vacationers and vacationers from access and departure. Nearly 17% discount of country wide CO₂ emissions in China may be attributed to nearly 50 – 90% discount capability of departing and 70% home flights because of pandemic, as in comparison to January 20, 2020 [23]. Subsequently, Wallace, (2020) additionally suggested that 96% of air journey dropped significantly from The International Energy Agency (IEA, 2020) suggested that oil call for has dropped 435,000 barrels national with inside the first 3 months of 2020 as in comparison to the identical length of 2019 [24-25]. Furthermore, national coal intake has additionally decreased because of much less strength call for in the course of the COVID-19 confinement length. According to CREA (2020) coal-primarily based totally energy technology decreased 26% in India with 19% discount of overall energy technology after lockdown [26]. CREA, *et al.* (2020) suggested that China the very best coal client with inside the world, dropped significantly to 36% examine to identical time of the 12 months, 2019 (early February to mid-March) [26]. UK primarily based totally weather technology and coverage internet site carbon quick in advance suggested that 25% CO₂ emission discount in China may be attributed to current COVID-19 pandemic crises, and however, under the appropriate restriction extra than months after the right COVID-19 lockdown USA entrance [27]. It turned into projected that, the pandemic should reduce one, six hundred metric heaps of CO₂, just like above

4% of the worldwide overall with inside the identical time of the previous 12 months [27]. Apart from affecting people's lives, the COVID crises is having a right away effect on strength use and greenhouse gas (GHG) emissions at each worldwide and EU tiers (IEA, 2020) worldwide strength call for in 2020 should fall via way of means of round 6% [25]. It is plain that short-time period discounts in strength use and emissions make 2020 objectives achievable, any long run dreams would require political choices that prioritize healing measures which make contributions extensively to weather alternate mitigation. Clearly, the transition of the strength and mobility structures have to boost up if we're to attain weather neutrality via way of means of 2050 [25].

2.2. Noise and (Un) Healthy Environments Associated with Air Quality

Dramatic development in air exceptional may be hyperlink to the maximum obtrusive quick-time period outcomes of COVID-19 lockdowns, in particular in a number of the arena's maximum polluted cities. Although air exceptional tiers look like returning to near-pre-lockdown tiers in lots of components of the arena as stringent lockdown measures are lifted and monetary sports healing possibilities begins. The duration of COVID-19 lockdown has discovered a number of the advantages that might be accomplished from a long-lasting and sustainable discount in air pollutants. It changed into anticipated that concentrations of NO₂ – a pollutant in particular emitted through avenue shipping fell sharply in lots of European international locations due to implementation lockdown measures with inside the spring of 2020 in addition to PM_{2.5}

pollutant [25]. Many researches had explored the position air pollutants performed in influencing the severity and unfold of COVID-19. Exposure to air pollutants have direct bearing with cardiovascular and respiration disease, each pre-current fitness situations recognized as risk-elements for dying in COVID-19 patient [28].

According to Sciomer, *et al.* (2020), lengthy-time period publicity to air pollutants is probably predicted to boom people' susceptibility to COVID-19 with preceding research having confirmed for instance, publicity to particulate matter (PM) as having hyperlink in worsening the impact of respiration viruses [29]. Recent researches have confirmed the hyperlinks among air pollutants and excessive mortality charges for COVID-19. Researchers had argued that when you consider that lengthy-time period publicity to air pollutants, such PM, ozone (O₃) and SO₂, weakens the immune defences of the higher airlines, this will allow the access of the SARS-COV-2 into the decrease airlines ensuing in contamination with COVID-19 [30].

It is that there was a sizeable drop in noise tiers for the duration of the COVID-19 lockdown, as noise pollutants from visitors is generally correlated with NO₂ tiers. Noise pollutants is the improved tiers of sound, generated from one-of-a-kind human sports (together with machines, vehicles, production work) which may also cause unfavourable affects in people and different biotic components [20, 31]. The quick time period discount for the duration of lockdown allow human beings to revel in the on the spot advantages of quieter cities. Sims (2020) pronounced that, round 360 million human

beings are vulnerable to listening to loss because of noise pollutants globally [32]. It is anticipated that over a hundred million human beings are uncovered to excessive noise tiers in Europe alone, above the endorsed limit [33]. However, environmental noise tiers are pronounced over an extended duration of time, as fitness outcomes seem whilst publicity is lengthy time period. Therefore, the live at domestic and quarantine measures as nicely decreased monetary sports ends in a discount of noise degree in maximum cities [20]. This confirmed, for example, noise degree of Delhi the capital of India, is decreased considerably round 40 – 50% with inside the latest lockdown duration [3]. Gandhiok & Ibra (2020) discovered that discount in noise degree of Govindpuri metro station (Delhi) correlate with a sizeable discount of car motion for the duration of the lockdown duration ranging 50 – 60 dB, from a hundred dB discount [34]. It is anticipated that noise degree of residential place of Delhi is decreased 55dB (day time) and 45dB (night) to 40dB (day time) and 30dB (night) respectively [35]. Subsequently, the remaining discount with inside the degree of noise pollutants may be attributed to a drastic discount with inside the quantity of flights and vehicular motion in addition to journey restrict round the arena. For instance, passenger air journey in Germany has been decreased through over 90%, vehicle visitors has dropped through >50% and trains are running <25% than the same old charges [32]. Hence, COVID-19 confinement and shutdown of monetary sports decreased the noise pollutants round the arena.

2.3. COVID-19 and Water Pollution Reduction

Developing us of a like Nigeria, India and Bangladesh is confronted with hassle of water pollutants, wherein home and business wastes are discharged into rivers without good enough remedy. For an extended time, it's been said in numerous literature that the improved industrialization, urbanization and anthropogenic sports with inside the ultimate a long time polluted the atmosphere, hydrosphere, and biosphere. There's a enormous development in floor water high-satisfactory in phrases of suspended particulate matter (SPM) with inside the Vembanad lake, the biggest freshwater lake in India [36]. This floor water high-satisfactory development has direct hyperlink with industries and people's sports close down for a month or greater in lots of components of the arena at some stage in pressure COVID-19 confinement. For example, the SPM estimated primarily based totally on mounted turbidity set of rules from Landsat-8OLI pics discovered the SPM awareness at some stage in the lockdown duration declined through 15.9% on average (range: 10.3% to 36.4% as much as 8mg/L lower) in comparison with the pre-lockdown duration. It is likewise found from time collection evaluation of satellite tv for pc photo collections (April 2013 – April 2020) that the SPM quantified for April 2020 is the bottom for eleven out of 20 zones of the Vembanad lake while in comparison with previous years, the share lower in SPM for April 2020 is as much as 34% from the preceding quantity.

Many research in air high-satisfactory and COVID-19 in lots of components of the arena validated a pointy decline at some stage in COVID-19 lockdown, degree for instance, carbon

emission stage at some stage in COVID-19 confinement dropped considerably [36]. As populations masses to the surroundings additionally get reduced owing to shut down of people's motion and business sports. However, the popularity pollutants with inside the hydrosphere (including lakes, rivers, oceans, and floor water reservoirs has obtained a whole lot interest with inside the literature or been investigated. For a long time, the hydrosphere has been severally polluted because of speedy urbanization, industrialization, and overexploitation. During the confinement duration, in line with Hader, *et al.*, (2020), the principal business reasserts of pollutants that influence aquatic ecosystems, including business waste water disposal, crude oil, heavy metals, and plastics have absolutely stopped [37]. Hence, the extent of pollutants is anticipated to be decreased significantly. For instance, Grand Canal in Italy, wherein the COVID-19 instances become on improved, grew to become clear, and reappearances of many aquatic species [38]. Also, the Ganges, a sacred however severally polluted river in India, turns cleanser at numerous locations at some stage in the global lockdown duration which starts on twenty fifth March, 2020 [39]. Singhal and Malto (2020) said that river Ganga and Yamuna have reached an enormous stage of purity due to the absence of business pollutants at the duration of lockdown in India [40]. It is recorded that, most of the 36 real-time tracking stations of river Ganga water from 27 stations met the allowable limit. This development of water high-satisfactory at Haridwar and Rishikesh may be attributed to the emergency of sewage and business effluents [3, 40].

All different parameters meet the countrywide consuming water high-satisfactory well-known receive overall coliform in a few tracking station that is consumable without traditional remedy technique however after disinfection (elegance A) [41]. It is likewise said that, the awareness of pH strength conductivity (EC), DO, BOD and chemical oxygen demand (COD) decreased significantly as much as 1 – 10%, 33 – 66%, 45 – ninety % and 33 – 82% respectively in numerous tracking station because of COVID-19 lockdown in comparison to the pre-confinement duration [42]. It is discovered that, water pollutants also are decreased considerably with inside the seaside regions of Bangladesh, Malaysia, Thailand, Maldives, and Indonesia [43-44]. Moreover, in line with Cooper (2020) the amount of business water intake is likewise decreased, especially from the fabric zone across the globe [45]. However, massive quantity of stable wastes is generated from production and production method which prompted water pollutants, additionally decreased in addition to export-import business, the traveller motion and motion of service provider deliver and different vessels are decreased additionally globally, because of emission discount along with marine pollutants.

2.4. Nature Restoration and Assimilation of Tourist Spots

In current times, traveller zone or enterprise has been taken into consideration as one of the quickest developing enterprise with inside the international and has witnessed a top notch boom because of technological improvements and delivery networks; which has giant effect to international gross home product (GDP) [46].

COVID-19 confinement techniques have demonstrated a crucial device for landscapes restoration.

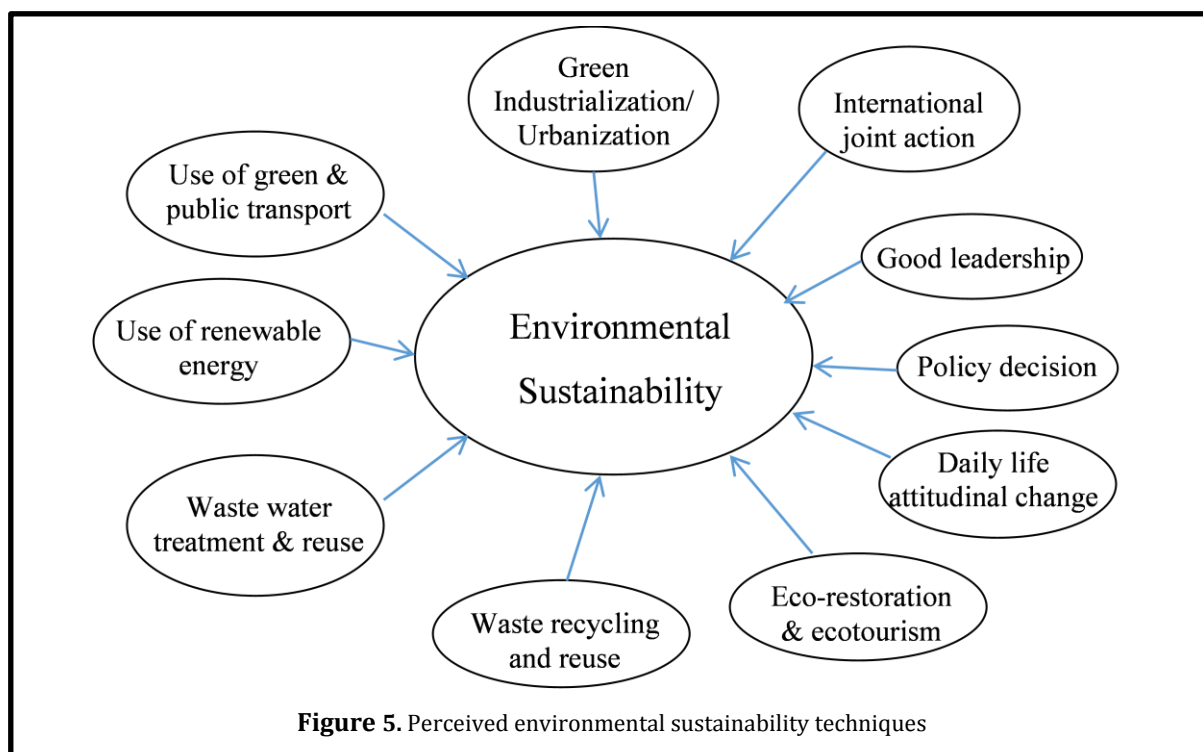
Pereira, *et al.* (2017) cited that traveller throughout the globe are commonly attracted through the locations of herbal splendour (e.g. beaches, islands, mountains, mangroves, herbal parks, and desolate tract and at a while make a considerable harsh [47]. To offer offerings to the traveller, several accommodations, motel, restaurant, bar, and marketplace are built, which eat massive quantity of electricity and different herbal resources. For example, Puig, *et al.* (2019) suggested that power and fuels intake take a key role, and 2-big name accommodations in Coastland Spain have the best carbon emission following his carbon footprint of coastland resort offerings of Spain [48].

Further, travellers and different site visitors dumps various wastes that have direct terrible effect at the herbal splendour of landscape, as a result, create ecological imbalance [49]. According to Zambrano-Monserrate, *et al.* (2020) the quantity of travellers has decreased considerably with inside the traveller outfit round the arena due to the COVID-19 outbreak and nearby confinement/restriction [20]. For example, Phuket, Nature-primarily based totally answers to the weather disaster have acquired mild interest with inside the past, as a result there may be a developing motion round the arena to repair landscapes.

3. PERCEIVED ENVIRONMENTAL SUSTAINABILITY TECHNIQUES

The international populace explosion has led to overexploitation of herbal resources. Generally,

boom with inside the intake sample because of globalization has led to progressed dwelling standard, speedy technological advancements, pollutants as a result of the goods and industries, and so on, have the herbal stability ensuing in international warming, air pollutants, water, weather change, extinction of species, lack of habitats and depletion of drinkable sparkling water. The COVID-19 pandemic is an eye-opener which cantered at the requirement to reconsider and re-set up the connection among guy surroundings together with elicitation of a international reaction and make us united to win towards the virus. Economic sports cannot curtail for the safety of the surroundings, hence, the idea of sustainability. This is the time, while it isn't always too late, to reflect on consideration on changing all financial sports into an environmentally sustainable one. Green economies, inexperienced industries and urbanization is the method wherein production industries and authorities of numerous kingdom of the sector solves the social, environmental and fitness troubles as a result of the enterprise and human interest via sustainable practices. Hence, its miles assumed that, all of those environmental and demanding situations are short-time period. Thus, it's miles excessive time to make a right method for long-time period advantage together with sustainable environmental control system. COVID-19 pandemic healing programs provide a unusual possibility to shift our economies in the direction of extra sustainable intake and intake. Similarly, the COVID-19 pandemic having offer an possibility for international reaction and make us united to return back effective towards the virus. Thus, to shield this globe, the house of



human beings, a concerted attempt of the nation's ought to be important [3]. Hence, a few viable strategies are proposed for international environmental sustainability (Figure 5).

3.1. Green Industrialization

Supporting inexperienced and sustainable deal techniques is instrumental in country wide and worldwide restoration plan for environmental sustainability and for the destiny of our planet, especially with the financial drop out from the COVID-19 pandemic. The restoration will convey diverse possibilities to boost up the transition to a greener and extra sustainable destiny. Worthy of note, is that industrialization is critical for financial increase; however, it's far excessive time to reflect on consideration on sustainability. We can't reflect on consideration on a international without the generation, merchandise and infrastructure that we've today. Economic sports can't be curtailed for the safety of the surroundings, thus, sustainability a critical

concept. For sustainable industrialization to end up it's far critical for each advanced and growing international locations of the sector to shift to much less power-in depth industries, use of cleanser fuels and technologies, and sturdy power green policies [50]. For instance, a few nations extensively the EU, and specially member states France and Germany have verified a push for low - carbon financial increase, prioritizing renewable power, inexperienced delivery, and nature healing and different environmentally useful or pleasant projects.

Studies on COVID-19 pandemic restoration plan discovered that many nations along with Korea took the COVID-19 crises as an possibility to spend money on inexperienced and virtual generation with its inexperienced new deal released as a part of the Korea New Deal in April 2020 [51]. This inexperienced deal is geared toward accomplishing weather neutrality via way of means of 2050. Moreover, environmentally sustainable companies enhance human welfare

via way of means of shielding uncooked fabric reasserts and stopping damage to human beings via way of means of making sure that the sinks for wastes aren't exceeded. Therefore, extra industries have to be installed in a few strategic zones, taking awareness that waste from one enterprise may be as properly used as uncooked substances of the different [52]. There are many techniques to inexperienced restoration and environmental sustainability of which shutting down of business zones in a round manner after a positive period, to lessen emission without inflicting low country wide financial increase in addition to moving country wide economies far from fossil fuels and onto a completely low carbon footing to a greener power. Subsequently, right distance and hygienic surroundings have to preserve in overcrowded industries to lessen the distribution of any infectious communicable disorder as a part of COVID-19 financial restoration plan. Hence, this examine brings perception into constructing a sustainable, inclusive international this is extra resilient to shocks

3.2. Use of Green and Public Transport

To notably lessen emission to its minimum level, it's far pertinent to inspire human beings thru enlightenment marketing campaign via way of means of diverse authorities and environmental groups, social media community and regulation enforcement groups to apply public delivery as alternative non-public automobiles. However, electric powered motors if produced in industrial amount will pass an extended manner to mitigate environmental trouble and in turn, lessen greenhouse gases (GHGS) globally [53]. To in addition reap emission discount goal,

human beings have to be recommended to apply bicycle in a quick distance, and public motorcycle sharing (PBS) system. Transport is a developing supply of carbon emissions, and a main purpose of the out of doors air pollutants that says 4.5m lives a 12 months globally [54]. Switching to electric powered car might reduce the ones troubles extensively, and the charges of electrical automobiles have come down speedy in latest years.

3.3. Use of Renewable Energy

Use of renewable power plays huge function in decreasing the GHGS emissions. As such has fantastic capability to decrease the call for of fossil fuels along with oil, herbal fuel and coal [54].

Korea and lots of European nations has followed its low-emission improvement method (LED) and reconfirmed its net-0 via way of means of 2050 dedication and set objectives to lessen GHG via way of means of 24.4 used on 2017 via way of means of 2030. However, as Korea and lots of European nations initiated Green deal, renewable and decentralized power stays the frontiers to convey actual change. The fundamental priorities for the method encompass low-carbon, constructing progressive surroundings and inexperienced enterprise [55]. It has been said that worldwide power call for has decreased extensively because of COVID-19 pandemic ensuing with inside the discount of emission and growth ambient air high-satisfactory in lots of locations [3, 20]. However, to preserve the everyday desires and country wide financial increase, it isn't feasible to rule out or reduce-off power call

for as with inside the case pandemic situation. Thus, use of renewable power reasserts like sun, hydropower, geothermal, heat, wind and biomass can meet power requirement and decreases the green residence gases (GHGS) emissions [54]. Worthy to note, is that sun and wind strength have plunged extensively in rate in latest years making them now aggressive or maybe less expensive than fossil gasoline energy in many nations. There has been file increase in renewable energy generation, with inside the COVID-19 era, no matter the COVID crisis. In growing nations, sun panels or wind farms have the capability to convert the lives of the six hundred million folks who lack get admission to energy, and a fast growth ought to put off the call for fossil gasoline and the want for the coal-strength plant production plans that have been revived via way of means of a few in reaction to the pandemic. In advanced nations, putting in sun panels might offer jobs and reduce family power bills

3.4. Recycling, Resource Use and Waste

To decrease the charge of wastes and environmental pollutants, especially water pollutants, each commercial and municipal wastes have to be recycled and reused. Presently human beings are the usage of face mask, hand gloves and different protection equipment, which growth the quantity of healthcare waste. In USA, trash amount has been growing due to accelerated PPE use on the home degree. Since the outbreak of COVID-19, the manufacturing and use of plastic primarily based totally PPE is growing worldwide. For example, China accelerated the each day manufacturing of scientific mask to 14.eight

million for the reason that from February 2020, that's lots better than earlier than [56]. However, if mask are probable to be the long-lasting signal of 2020, they're the latest supply of plastic waste, with hundreds of tonnes of discarded PPE now including to the scourge of plastic filling our seas and littering streets. This is the time for societies around the world to rethink how we cope with our waste generally. It is crucial to observe that recycling generation has progressed making extra plastics without difficulty recyclable than earlier than. Hence, inexperienced investments plan or circularity structures have to put in force with inside the manufacturing method to lessen the usage of uncooked fabric and waste generation [52]. Furthermore, consistent with WHO (2020) risky and infectious scientific waste have to be well controlled through strictly following the guidelines. Recycling may be worthwhile and offers professional and semi-professional jobs in a long time and solid industry, making it some other goal for the inexperienced restoration. It is apparent that majority of the human beings like growing nations does now no longer realize what waste segregation and disposal problem represent [57]. Hence, government at distinctive stages have to put in force huge awareness marketing campaign via diverse mass media in view to right waste segregation, dealing with and disposal techniques.

3.5. Wastewater Treatment and Reuse

Wastewater has been taken into consideration as reasserts of water pollutants. Hence, have to be handled well earlier than discharge. However, reuse of handled wastewater in non-manufacturing method along with bathroom

flushing, indoors and avenue cleansing can lessen the weight of get right of entry to water withdrawal.

3.6. Nature Restoration and Ecotourism

Growing timber stays amongst others, the number one approaches of tackling the worldwide weather disaster, and offers a manner to counter our on-going destruction of critical landscapes and natural world habitats. Nature primarily based totally answers to the weather disaster have obtained little interest with inside the past, however there may be a developing motion round the sector to repair landscapes. More additionally for ecological restoration, visitor spots and maritime sports have to periodically shutdown after a few lengths in addition, ecotourism practices have to be harness to sell sustainable livelihoods, cultural preservation, and biodiversity conservation [49].

3.7. Altitudinal Change in Daily Life

The problem of human behavioural extrude need to be tackled so one can obtain sustainable surroundings via carbon emission reduction. Notably, it's miles important to extrude the conduct in our each day lifestyles and substantially low intake charge or sources like; keep away from processed and take regionally grown meals, make compost from meals waste, transfer off or unplug digital gadgets whilst now no longer used, and use a bicycle in preference to an automobile for shorter distances.

3.8. International Togetherness

We can't obtain sustainable environmental purpose without worldwide cooperation. World

leaders and environmental professionals throughout the international locations need to place motion in movement to fulfil the sustainable environmental purpose and shield worldwide environmental sources. However, worldwide cooperation has been validated to be a device to sell the inexperienced deal technique as pandemic restoration plan for financial growth. Hence, accountable worldwide authority like United Nations Environment Programme (UNEP) have to take proactive function to put together time-orientated guidelines, arrange worldwide conventions and coordination of worldwide leaders shape right implementation. Furthermore, PAGES have to take a main function to undertake pandemic restoration plan with recognition on inexperienced investments geared toward reaching sustainable and resilient financial growth.

3.9. Environmental Policy and suitable management

Policy and suitable management stays key to environmental sustainability. The purpose of sustainable commercial enterprise exercise as a part of COVID-19 financial restoration plan can't be done without suitable management and environmental coverage decision. Hence, authorities at distinctive degree have to embody inexperienced economic stimulus applications to obtain extra and decrease pollutants as they flip their interest to financial restoration. The enjoy of nations with inexperienced economic stimulus applications on the time of the 2008 financial crises, offers a few training and indicates it's miles feasible to develop lower back greener. Green economic stimulus refers to

guidelines and measures that assist to stimulate financial pastime with inside the short-term, create situations for long time enlargement of output, and assist enhance environmental results with inside the close to and longer term.

4. CONCLUSION

Notably, pandemic is adversely affecting human life and global economy which in turn affecting the environment and climate where we live. Pandemic crisis is an eye-opener, that man induced activities has impacted severely on the environment and we must have a rethink about harmony between man and environment. Moreover, the pandemic has helped us peep into the potential techniques to achieve environmental sustainability through green investments and to achieve green and resilient economic growth. The global response of pandemic opened our eyes to put action together to fight against the threat to mankind. Hence, united and concerted time oriented effort can strengthen environmental sustainability and protect the globe from the effects of global climate change.

5. ACKNOWLEDGEMENT

NA

6. CONFLICT OF INTEREST

The authors have declared that there is no conflict of interest.

7. SOURCE/S OF FUNDING

NA

8. REFERENCES

1. Clark, A., Jit, M., Warren-Gash, C., Guthrie, B., Wang, H. H., Mercer, S. W., & Jarvis, C. I. (2020). Global, regional, and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2020: a modelling study. *The Lancet Global Health*, 8(8), e1003-e1017.
2. Clark, E., Fredricks, K., Woc-Colburn, L., Bottazzi, M. E., & Weatherhead, J. (2020). Disproportionate impact of the COVID-19 pandemic on immigrant communities in the United States. *PLoS Neglected Tropical Diseases*, 14(7), e0008484.
3. Tilley, F., & Young, W. (2009). Sustainability Entrepreneurs. *Greener Management International*, (55).
4. Somani, S. S., Richter, F., Fuster, V., De Freitas, J. K., Naik, N., Sigel, K., & Nadkarni, G. N. (2020). Characterization of patients who return to hospital following discharge from hospitalization for COVID-19. *Journal of general internal medicine*, 35(10), 2838-2844.
5. Tripathi, A. N. U. J., & Bagga, T. E. E. N. A. (2020). Leveraging Work from Home for Business Continuity during COVID-19 Pandemic-With Reference to BI Solution Adoption. *Indian Journal of Economics and Business*, 19(1), 19-34.
6. Chakraborty, I., & Maity, P. (2020). COVID-19 outbreak: Migration, effects on society, global environment and prevention. *Science of the Total Environment*, 728, 138882.
7. Saadat, S., Rawtani, D., & Hussain, C. M. (2020). Environmental perspective of

- COVID-19. *Science of the Total Environment*, 728, 138870.
8. Nyekwere, E. H. (2020). The Impacts of the Covid-19 Coronavirus Pandemic on International Environmental Protection. *JL Pol'y & Globalization*, 101, 96.
 9. Chauhan, A., & Singh, R. P. (2020). Decline in PM_{2.5} concentrations over major cities around the world associated with COVID-19. *Environmental Research*, 187, 109634.
 10. Kumar, P., Hama, S., Omidvarborna, H., Sharma, A., Sahania, J., Abhijith, K.V., & Tiwari, A. (2020). Temporary reduction in fine particulate matter due to 'anthropogenic emissions switch-off' during COVID-19 lockdown in Indian cities. *Sustain. Cities Soc.* 62, 102382. <https://doi.org/10.1016/j.scs.2020.102382>.
 11. Mahato, S., Pal, S., & Ghosh, K. G. (2020). Effect of lockdown amid COVID-19 pandemic on air quality of the megacity Delhi, India. *Science of the total environment*, 730, 139086.
 12. Ranjan, A. K., Patra, A. K., & Gorai, A. K. (2020). Effect of lockdown due to SARS COVID-19 on aerosol optical depth (AOD) over urban and mining regions in India. *Science of the Total Environment*, 745, 141024.
 13. Sharma, H. B., Vanapalli, K. R., Cheela, V. S., Ranjan, V. P., Jaglan, A. K., Dubey, B., & Bhattacharya, J. (2020). Challenges, opportunities, and innovations for effective solid waste management during and post COVID-19 pandemic. *Resources, Conservation and Recycling*, 162, 105052.
 14. Zhou, C., Su, F., Pei, T., Zhang, A., Du, Y., Luo, B., & Xiao, H. (2020). COVID-19: challenges to GIS with big data. *Geography and sustainability*, 1(1), 77-87.
 15. Shi, Y., Wang, G., Cai, X. P., Deng, J. W., Zheng, L., Zhu, H. H., & Chen, Z. (2020). An overview of COVID-19. *Journal of Zhejiang University-SCIENCE B*, 21(5), 343-360.
 16. Kerimray, A., Baimatova, N., Ibragimova, O. P., Bukenov, B., Kenessov, B., Plotitsyn, P., & Karaca, F. (2020). Assessing air quality changes in large cities during COVID-19 lockdowns: The impacts of traffic-free urban conditions in Almaty, Kazakhstan. *Science of the Total Environment*, 730, 139179.
 17. Krecl, P., Targino, A. C., Oukawa, G. Y., & Junior, R. P. C. (2020). Drop in urban air pollution from COVID-19 pandemic: Policy implications for the megacity of São Paulo. *Environmental Pollution (Barking, Essex: 1987)*, 265, 114883.
 18. Karuppasamy, M. B., Seshachalam, S., Natesan, U., Ayyamperumal, R., Karuppannan, S., Gopalakrishnan, G., & Nazir, N. (2020). Air pollution improvement and mortality rate during COVID-19 pandemic in India: global intersectional study. *Air Quality, Atmosphere & Health*, 13(11), 1375-1384.
 19. Shakoor, A., Chen, X., Farooq, T. H., Shahzad, U., Ashraf, F., Rehman, A., & Yan, W. (2020). Fluctuations in environmental pollutants and air quality during the lockdown in the USA and China: two sides of COVID-19 pandemic. *Air Quality, Atmosphere & Health*, 13(11), 1335-1342.

20. Zambrano-Monserrate, M. A., Ruano, M. A., & Sanchez-Alcalde, L. (2020). Indirect effects of COVID-19 on the environment. *Science of the total environment*, 728, 138813.
21. Otmani, A., Benchrif, A., Tahri, M., Bounakhla, M., El Bouch, M., & Krombi, M. H. (2020). Impact of Covid-19 lockdown on PM10, SO2 and NO2 concentrations in Salé City (Morocco). *Science of the total environment*, 735, 139541.
22. Henriques, M. (2020). Will Covid-19 have a lasting impact on the environment. *BBC news*.
23. Zogopoulos, E. (2020). COVID-19: the curious case of a green virus. *Energy industry review*, 11.
24. Wallace, M. (2020). COVID-19 in correctional and detention facilities—United States, February–April 2020. *MMWR. Morbidity and mortality weekly report*, 69.
25. European Environmental Agency (2020). Air pollution goes down as Europe takes hard measures to combat coronavirus. <https://www.eea.europa.eu/highlights/air-pollution-goes-down-as>
26. CREA, (2020). Air quality improvements due to COVID-19 lockdown in Indian centre for Research on Energy and Clean Air. <https://energyandcleanair.com/airquality-improvements-due-to-covid-19-lockdown-in-india>.
27. Evans, S. (2020). Global emissions analysis: coronavirus set to cause largest ever annual fall in CO2 emissions, carbon brief. <https://www.carbonbrief.org/analysis-coronavirus-set-to-cause-largest-ever-annual-fall-in-co2-emissions>.
28. Xue, X., Yu, H., Yang, H., Xue, F., Wu, Z., Shen, W., ... & Rao, Z. (2008). Structures of two coronavirus main proteases: implications for substrate binding and antiviral drug design. *Journal of virology*, 82(5), 2515-2527.
29. Sciomer, S., Moscucci, F., Magri, D., Badagliacca, R., Piccirillo, G., & Agostoni, P. (2020). SARS-CoV-2 spread in Northern Italy: what about the pollution role?. *Environmental monitoring and assessment*, 192(6), 1-3.
30. Conticini, E., Frediani, B., & Caro, D. (2020). Can atmospheric pollution be considered a co-factor in extremely high level of SARS-CoV-2 lethality in Northern Italy?. *Environmental pollution*, 261, 114465.
31. Goines, I., & Hagler, I. (2020). Noise pollution: a modern plague. *South.med.J.*, 100(3), 287-294.
32. Sims, J. (2020). Will the world be quieter after the pandemic. *BBC Future*.
33. WHO, (2020a). Coronavirus disease (COVID-19) pandemic? World Health Organization, Geneva. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>.
34. Gandhiok, J and Ibrar, M. (2020). Covid-19: Noise pollution falls as lockdown rings in sound of silence. *Times of India*.
35. Central Pollution Control Board, 2020. Retrieved from: <https://cpcb.nic.in/who-guidelines-for-noise-quality/>
36. Yunus, A. P., Masago, Y., & Hijioka, Y. (2020). COVID-19 and surface water quality: Improved lake water quality during

- the lockdown. *Science of the Total Environment*, 731, 139012.
37. Häder, D. P., Banaszak, A. T., Villafañe, V. E., Narvarte, M. A., González, R. A., & Helbling, E. W. (2020). Anthropogenic pollution of aquatic ecosystems: Emerging problems with global implications. *Science of the Total Environment*, 713, 136586.
38. More, A. F., Loveluck, C. P., Clifford, H., Handley, M. J., Korotkikh, E. V., Kurbatov, A. V., ... & Mayewski, P. A. (2020). The impact of a six-year climate anomaly on the "Spanish flu" pandemic and WWI. *GeoHealth*, 4(9), e2020GH000277.
39. Yamada, T., Yamada, H., & Mani, M. (2020). Is exposure to air pollution a risk factor for COVID-19 fatality rate? Evidence from India as of May 15, 2020. Evidence from India As of May, 15.
40. Singhal S, Matto M (2020) COVID-19 lockdown: a ventilator for rivers. In: DowntoEarth. <https://www.downtoearth.org.in/blog/covid-19-lockdown-a-ventilator-for-rivers-70771>.
41. Uttarakhnad pollutants manipulate Board [UPCB]; and BIS, 2012 <https://ueppcb.uk.gov.in/pages/view/168-covid-19-bio-medical-waste-management--at-health-care-facility>
42. Arif, M., & Kumar, R. (2020). Reduction in water pollution in Yamuna river due to lockdown under COVID-19 pandemic.
43. Kundu, B., Panda, D., Vissa, N. K., & Tyagi, B. (2022). "Novel 2019 Coronavirus Outbreak" through the Eyes of GNSS Signal. *Journal of the Geological Society of India*, 98(1), 83-87.
44. Rume, T., & Islam, S. D. U. (2020). Environmental effects of COVID-19 pandemic and potential strategies of sustainability. *Heliyon*, e04965.
45. Cooper, R. (2020). Water security beyond Covid-19.
46. Lenzen, M., Sun, Y. Y., Faturay, F., Ting, Y. P., Geschke, A., & Malik, A. (2018). The carbon footprint of global tourism. *Nature Climate Change*, 8(6), 522-528.
47. Sanches-Pereira, A., Onguglo, B., Pacini, H., Gómez, M. F., Coelho, S. T., & Muwanga, M. K. (2017). Fostering local sustainable development in Tanzania by enhancing linkages between tourism and small-scale agriculture. *Journal of Cleaner Production*, 162, 1567-1581.
48. Puig R, Kiliç E, Navarro A, Albertí J, Chacón L, Fullana-i-Palmer P (2017) Inventory analysis and carbon footprint of coastland-hotel services: Spanish case study. *Sci Total Environ* 595:244–254.
49. Islam SMD, Bhuiyan MAH (2016) Impact scenarios of shrimp farming in coastal region of Bangladesh: an approach of an ecological model for sustainable management. *Aquac Int* 24(4):1163–1190.
50. Pan, E. (2019). Green's functions for geophysics: A review. *Reports on Progress in Physics*, 82(10), 106801.
51. Partnership for Action on Green Economy [PAGE], 2021. Retrieved from <https://www.un-page.org/>
52. Hysa, E., Kruja, A., Rehman, N. U., & Laurenti, R. (2020). Circular economy innovation and environmental sustainability impact on economic growth:

- An integrated model for sustainable development. *Sustainability*, 12(12), 4831.
53. Li, T., Shen, H., Zeng, C., Yuan, Q., & Zhang, L. (2017a). Point-surface fusion of station measurements and satellite observations for mapping PM_{2.5} distribution in China: methods and assessment. *Atmos. Environ.* 157, 477–489.
54. Ellabban, O., H. Abu-Rub, and F. Blaabjerg. 2014. Renewable energy resources: Current status, future prospects and their enabling technology. *Renewable and Sustainable Energy Reviews* 39:748–64
55. Global Green Growth Institute, 2020. Retrieved from: <https://gggi.org/>
56. Fadare, O. O., & Okoffo, E. D. (2020). Covid-19 face masks: A potential source of microplastic fibers in the environment. *The Science of the total environment*, 737, 140279.
57. Rachman, F., Taufika, R., Kabatiah, M., Batubara, A., Pratama, F. F., & Nurgiansah, T. H. (2021). Pelaksanaan Kurikulum PPKn pada Kondisi Khusus Pandemi Covid-19. *Jurnal Basicedu*, 5(6), 5682-5691.
58. European Space Agency (2020): Retrieved from <https://www.esa.int/>
59. Adapted from Centre for Research on Energy and Clean Air satellite Image (2020): Retrieved from <https://energyandcleanair.org/>
60. European Space Agency satellite Image (2020): Retrieved from <https://earth.esa.int/eogateway>