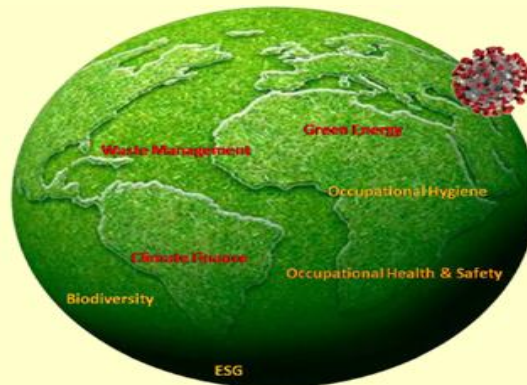


Current Issue: Emerging Opportunities in Environment Management in Post Covid- 19 Era



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From Director's Desk



“In time of change, learners inherit the earth, while learned find themselves beautifully equipped to deal with the world that no longer exists” by Eric Hoffer

The year 2020 will be known in history for the Corona pandemic, lockdown, layoffs and boom in digital learning. The pandemic has forced corporate leaders to develop future business strategies with new perspectives for better and faster implementation. In the moment of crisis there were some learning and ray of hope for the future. With the advancements in digitalization, ample opportunities were available for professionals during pandemic to upgrade and upskill their knowledge. However, young professionals need to be farsighted to recognize the skills, knowledge and capabilities as per the future requirements.

In environment sector, decrease in pollution and rare sighting of some animals were bright spots of 2020 that reminded us importance of respecting the natural boundaries. However, many industrial hazards were reported from different industries with the starting of un lockdown phase. Further, causing factors and solutions for Corona pandemic is in Wildlife sector but its rampant exploitation, poor safety and sanitation protocols are forcing us to define new strategy for their better conservation and management. In post Covid – 19 era we need to redefine, reform and re enforce policies, technologies and safety protocols with better perspective. The current issue of the newsletter is aiming to enlighten young professionals about the emerging opportunities in environment management sector in post Covid- 19 era.

Dr. Seema Mishra

OPPORTUNITIES FOR PROFESSIONALS IN SUSTAINABLE ENVIRONMENT MANAGEMENT IN POST COVID 19 ERA

**Dr. Nanadakishor T. Joshi, Director,
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The worldwide disturbance caused by the COVID-19 pandemic has impacted environment and climate. The considerable decline in planned travel, industrial activities have caused many regions to experience a huge drop in air pollution leading to rare situations such as Himalayas being visible by naked eye from UP after 30 years, Central Pollution Control Board (CPCB) reported 46 per cent reduction in PM_{2.5} levels and 50 per cent depletion in PM₁₀ concentrations in the national capital Delhi, 71% drop in NO₂ levels is observed for Mumbai while Navi Mumbai observed a 62% drop as per the CPCB data.

➤ **COVID-19 Impacts and Changed Habits:**

- 1) Limited physical interactions between company employees and client contractors.
- 2) Difficulties in Site access.
- 3) Increase cost of employee liability insurance.
- 4) Companies focusing on cost reduction by increasing efficiency and technology solutions.

➤ **Effective solid waste management during and post COVID-19 Pandemic:**

- There is increased waste and reduction in waste recycling
- Business as usual (BaU) cannot continue wrt waste management during this pandemic.
- There are changes in waste segregation and segregated waste collection practices
- Necessity of proper disposal of Personal Protective Equipment (PPE) has increased
- Appropriate monitoring, review and verification mechanisms has become necessity for Common Biomedical Waste treatment facilities (CBMWTFs).

➤ **Effective Plastic Waste Management during and post COVID-19 Pandemic:**

- There are challenges of plastic waste management COVID-19 pandemic Plastic management initiatives post COVID-19
- Future outlook for managing the plastic waste management has changed.
- Plastic waste by segment, is increasing in the trend of medical, food packaging, and other plastic waste.
- **Effective Bio-medical waste management during and post COVID-19 pandemic:**
- There is huge impact of the pandemic on biomedical waste
- Challenges of biomedical waste management COVID-19 pandemic have increased
- There are Biomedical waste management initiatives post COVID-19
- Future outlook for managing the biomedical waste management is must
- **Inferences:**
- Waste management priorities to be kept in mind during the pandemic
- The COVID-19 pandemic has presented unprecedented challenges to the international community but it also offers a unique window of opportunity to rebuild economies in a way that recognizes and reinforces the close links between human wellbeing and a healthy environment.
- Sustainable practices and Sustainable environmental policies can help societies fulfill their needs and aspirations in the post-COVID-19 era by helping steer the economic recovery onto a more sustainable and resilient track.
- In the post crises scenario, the endeavour should be to create better opportunities for green investments while adhering to the standards of sustainable production and consumption.
- **Redefining Urban Planning and Job Opportunities for Trained Professional:**

- 1) Transportation Pollution contributes about 15% of the total air Pollution. Smart mobility like push for EV, recharging infrastructures for e-bikes and e-scooters, solar driven vehicles like solar cars, solar bikes, along with initiatives like carpooling and well-developed public transportation, even odd schemes, improvement in infrastructures with interconnected cycle highways, smart renting schemes, etc. will reduce transportation pollution. Smart mobility apps can help people link up different modes of transportation. Cities like Amsterdam have demonstrated all this is perfectly possible.

Example-Electric bike services YULU, Zyp Rentals app for scooter rental services

- 2) Green recovery could be assisted by reducing environment impact such as by building a new generation of decentralized water tanks, shared between neighboring apartment owners. This would be better for the environment as rainwater is preserved and could be used for gardening and cleaning outside the home. This provides an excellent opportunity for innovative entrepreneurs and area experts to come up with new business models.

Example- Chennai based NGO works on business model “water as a service”. This NGO uses just industrial premises for installation of rainwater harvesting system. It takes care of capital and operation maintenance cost on its own. It only charges Industry on basis of treated water use by industry in their premises.

- 3) Shifting towards renewable energies coupled with such as wind and solar for independent electricity provision for individuals making them more independent, light through green building shall make people more healthy and stress free. Covid has also shown how high density housing can accelerate spread of pandemics. Shift to low density, spread out housing along with providing open spaces, gardens will be more preferred by town planners.

- 4) This generates new job openings for the architects, Interior designer, renewable energy planner with respect to the innovative needs of society. Further the environmentalists and NGOs can enrich their knowledge and experience from COVID scenario and act as a environmental consultant in designing new generation cities.

“Sponge city” (a city structured and designed to absorb and capture rain water and utilize it to reduce floods) initiatives can be implemented to reduce the risk of urban floods by increasing green spaces, restoring wetlands and using permeable new construction materials to absorb rainwater and delay runoff as a measure of prevention of water born epidemic which may result from flooding disasters Example: Extremely Severe Cyclonic Storm Fani striking in Odisha in April 2019, cyclone Nisarga shattering Konkan in June 2020.

- 5) The government now decides to plan and implement methodical and area specific plantation in the affected coastal region in consultation with marine experts in order to create natural barrier between sea and villages This may result in lots of future job generation for young and experienced botanists and zoologists, and environmental consultants.

Example: Goa State Biodiversity Board gave job opportunity of making People's Biodiversity Register (PBR) to young passionate post graduates who had formed NGO together. Government agencies are willing to invest in young professionals who are looking to think out-of-the box.

Environment Management Sector in Post Covid Era: Requirement of Trained Professionals:

➤ Scope for Entrepreneurship:

Entrepreneurship has taken a leading role in fighting COVID-19. Collaboration and cooperation are the new need of future. The

demand for new products like smart bins, app based vegetable and fruit delivery, alcohol free sanitizer, touchless sanitizer dispenser, portable biomedical waste incinerator, foot operated sanitizer dispenser are bringing many opportunities for arising and existing entrepreneurs.

➤ **Promising Solutions to Environmental Monitoring Work with Respect to Covid Scenario**

Issues in environmental monitoring task with respect to COVID Scenario:

- 1) Interaction and group work between industry, laboratory staff, laboratory samplers.
- 2) Involvement of different groups expose people to the infection from different areas which may be far from each other.
- 3) The overall monitoring and sampling time spent is more resulting in grouping of people together for longer duration.
- 4) There are many equipment and material handling involved in monitoring and sampling analysis work. The handling of material and equipment by multiple people may increase the risk of transfer of infection.
- 5) The team of sampler travels in the official vehicle to and fro the Industry resulting in people coming in contact with each other at regular interval.

- 6) Current practice of result sharing hardcopies of involves transfer of material touch from one person to another.

➤ **Sustainable solution for preventing COVID spread with Environmental monitoring work:**

Application of sophisticated instrument with digital data logging, software modeling, Application of testing kits will reduce no. of workers required for conducting activities. example flue gas analyser, weather station, portable turbidity meter, pen based pH, conductivity & TDS Meter, SCADA system for remote monitoring, online continuous monitoring system, GIS computer system, compost testing kit, potable water test kit.

Entrepreneurial opportunities in new age economy specially in digital world will eliminate middle men to reach directly to customer, New responsive business models are being developed and nurtured by innovative young talented youngsters who collaborate and challenge the traditional models, Opportunities are arising to learn new skills in new areas such as remote and continuous monitoring of environmental parameters along with their analysis. By being involved in design, development and implementation of testing kits and instrumentation, lots of demands are cultivated into opportunities. This is the future.

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SUSTAINABLE OCCUPATIONAL SAFETY AND HEALTH IN POST COVID 19 ERA

**Mr. Vinod Sant
Former Director General
National Safety Council of India**

Introduction

The subject of Occupational Safety and health (OSH) has always been on the priority of International Labour Organization (ILO) right from its inception in 1919. The Hours of Work in Industry Convention (No. 1) 1919 focussed on limiting the working hours of industrial workers to protect their health against excessive fatigue. Since then there have been several international declarations committing to the cause of OSH and seeking engagement of all stakeholders.

The 2030 Agenda for Sustainable Development was adopted by the United Nations General Assembly (UNGA) on 25th September 2015, during its 70th session held in New York USA. The Agenda contains 17 Sustainable Development Goals (SDGs) to be achieved by 2030. The SDG 8 seeks to promote sustained, inclusive and sustainable economic growth; the full and productive employment and decent work for all. The Goal also has total 12 targets to be achieved. The target 8.8 is relating to promotion of labour rights and promotion safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment. The frequency rate of fatal and non-fatal occupational injuries; and increase in national compliance of labour rights based on ILO instruments and national legislation, are two indicators of performance against the targeted goal.

Impact of COVID 19

The Corona Virus SARS 2 was first reported in India in December 2019 and by March 2020 the country had several cases of COVID 19. The Ministry of Home Affairs announced nation-wide

complete lock-down (in the form of Guidelines for prevention of spread of pandemic) vide its order No. 40-3/2020-DM-I(A) dated 24th March 2020 with immediate effect for 21 days. The lockdown was extended up to 31st May 2020 in another three spells of notifications.

The lockdown severely impacted the economic activities in the country. Several industries were shut down, rendering lakhs of people jobless. As per one estimate 121 million persons lost their jobs during the first phase of lockdown. Majority of workers were the migrant workers. So many of them left for their native places with whatever means possible including walking. Millions of people were left with no food, no shelter and pushed in to the poverty. The economy also reported 23.9% decline in GDP in the first quarter of 2020-21 which is still struggling to get back to 2018-19 level. The COVID 19 pandemic itself had affected about 6.2 million people by end of September 2020, which has risen to more than 10.41 million as on 7th January 2021. Due to the fear of pandemic and also thanks to the strict government guidelines people were forced to observe social distancing, remain indoors, avoid gathering at public places including markets and shops. This had devastating effect on the physical as well as the mental health of many people otherwise not suffering from COVID 19.

Unlocking and OSH

The first phase of 'un-locking' was announced with effect from 1st June, 2020 wherein many economic activities including inter-state travel, were permitted outside the containment zones. However, many businesses and industries faced severe shortage of

labour particularly experienced and skilled workers. As a result, many small and medium scale industries could not meet demands of large industries. Even the large enterprises could not operate with full capacity and were struggling with lean and inexperienced workforce.

Consequent to the unlocking, certain types of manufacturing activities such as those in SEZs, EOUs, IT hardware, packaging material including jute, continuous process units and their supply chain etc., outside the containment zones were permitted subject to certain conditions. Many of such units were shut down for more than a month and were eager to restart their operations. Some of these units also obtained special permissions for making preparations prior to restarting. But due to certain lapses in following safe practices many accidents were reported by factories during restarting phase of their normal operations. Based on the information published in print and electronic media, during the period April to June, total 16 incidents, including 13 in factories, and one each in mine and oil-field were reported; involving 43 fatalities in factories, and 6 in mines and oil-field together; and 683 non-fatal injuries. As against this total 7 incidents involving 36 deaths were reported prior to the lockdown (January-February). This possibly reflects lack of safety preparedness prior to and during restarting of industrial operations.

The release of Styrene vapours from storage tank of LG Polymers, Visakhapatnam in Andhra Pradesh on 7th May 2020, was the one of the most serious accidents in the recent past, reminding the horrors of Bhopal disaster in 1984. The accident involved release of over 800 metric tonnes of Styrene resulting in 12 deaths and hospitalization of another 585 persons. About 20,000 people from four neighbouring villages were also evacuated to shelter homes. On the same day, boiler explosion took place in Neyveli Lignite Corporation Tamil Nadu resulting in four deaths and serious injuries to another four persons. Another explosion in Yashashvi Rasayan, a chemical factory in Dahej

Gujrat on 3rd June 2020, killed 10 workers with injuries to 50 other persons.

Government initiatives towards normalization

The Government of India as well as various State Governments initiated efforts for providing income, food and health protection to all vulnerable sections of the population during the lockdown. Providing opportunities of income generation to many of those without jobs was the major task for the government. As per the estimates released by Indian Society of Labour Economics in June 2020, 80 per cent jobs were affected in urban economy comprising of mostly self-employed workers and 54 per cent jobs were affected in rural economy most being in casual employment. The Government initiatives in income generation included employment guarantee under MGNREGA; promotion of rural manufacturing and handicraft, brass, khadi products; skill mapping and training of migrants; implementation of National Employment Policy; administration of National Electronic Employment Exchange; providing credit facilities to self-employed persons and MSMEs. As a result, the unemployment rate declined from 23.5% in April 2020 to 8.5% in June 2020 and further to 6.5% in November 2020. (CMIE estimates)

In order to give boost to the flagging economy, the Government of India announced INR 20 trillion economic package on 15th May 2020. Funding to the real estate sector particularly the construction contractors; fertilizer subsidy; new employment schemes; strengthening rural economy were some of the salient efforts. The efforts have resulted in improving the economic activities more in rural sector and less in urban sector. The economy is projected to contract 7.5% this fiscal as against the contraction of 23.7% in the first quarter of 2020-21. (RBI estimates)

Ease of doing business and connected reforms are the two areas the Government has been continuously striving since 2015. There has been

considerable improvement in India's ranking in the World Bank's Doing Business Report (DBR) from 142 in 2015 to 63 in 2020. As part of further strengthening, the Government introduced four Labour Codes consolidating 29 Central Labour Laws. These Labour Codes are (i) The Code on Wages 2019 (ii) The Industrial Relations Code 2020 (iii) The Social Security Code 2020 and (iv) The Occupational Safety, Health and Working Conditions (OSHC) Code 2020.

The OSHWC Code consolidates 13 Central Labour Laws like The Factories Act 1948, The Mines Act 1952, The Dock Workers (Safety, Health and Welfare) Act 1986, The Building and Other Construction Workers Act 1996, The Contract Labour Act 1970, The Plantation Labour Act 1951. The Code contains provisions relating to safety, health, working conditions, working hours, leave with wages, workplace welfare, regulation of employment, conditions of service. It is applicable to establishments employing 10 or more workers including plantations and construction sites; factories with power and employing 20 or more workers, factories without power but employing 40 or more workers, mines and docks. The salient features of the Code include requirements relating to appointment of Safety Officer, constitution of safety committee, third party audit and certification etc.

Environment, Social and Governance (ESG) Standards

Sustainable investment including socially responsible, ethical and ESG investing has already gained foothold in financial market globally. Prior to 2012 main focus of ESG investing has been the equity market where the investors would attach value to the companies with higher level of compliance with ESG standards. In 2012 the International Finance Corporation (IFC) part of the World Bank Group, included ESG parameters in its Performance Standards and Corporate Governance Methodology for assessment and monitoring of IFC

financed projects. With adoption of 17 SDGs by United Nations in 2015, ESG standards are gaining further attention in the form of sustainable investing. As per the survey conducted by Morgan Stanley in 2017, 75% of US millennial investors believe that their investment can influence climate change, where as 86% are interested in sustainable investing.

The National Guidelines on Responsible Business Conduct (NGRBC) were framed by the Ministry of Corporate Affairs (MCA) in March 2019 to demonstrate India's commitment to achievement of SDGs. Promotion of well-being of all employees including those in value chains is one of the 10 principles enshrined in the NGRBC. Further MCA is in the process of developing Business Responsibility Reporting format for the use by companies. With effect from July 2019, the Securities and Exchange Board of India (SEBI) also has extended the coverage of the SEBI (Listing Obligation and Disclosure Requirements) Regulations 2015 to the top 1000 listed companies. As part of the requirements the companies have to publish Business Responsibility Report (BRR) in their annual report.

Responsibilities of organizations

The OSHWC Code 2020 places duties on employers to ensure that the workplaces are free of any hazards, safe working environment is provided and maintained, toxic and hazardous waste is disposed of in safe manner and that OSH standards declared by the Central Government are complied with. Specific responsibilities have also been prescribed in respect of employers of factories, mines, construction sites, docks and plantations. It is pertinent to emphasise here that the OSHWC Code provisions are applicable to all employees including contract labour and inter-state migrant workers.

In light of the COVID 19 pandemic it has also become necessary for organizations to ensure

wellness of all employees in order to maintain business continuity. For this purpose, they need to follow the Government guidelines issued from time to time. Many organizations have introduced mandatory entry level health check-up such as temperature and blood oxygen levels for all employees. Periodic medical examination of certain workers is also mandated under the OSHWC Code. The mental health of the employees particularly the contract labour, migrant workers, women workers and such other vulnerable workers has also caught attention of organizations as well as the government.

With increased level of outsourcing of even essential and core business activities, the organizations need to undertake OSH risk assessment and employ adequate control measures to ensure protection of health and safety of workers engaged throughout the value chain for sustainability of their business operations. Ensuring compliance with labour standards in entire supply chain is also one of the performance indicators under the ESG standards.

Occupational Safety and Health – Need and opportunities for professional development

Traditionally OSH has been the domain of safety officers having requisite qualifications and appointed to advise the managements on compliance with OSH provisions under various labour laws. In addition, medical professionals trained in occupational health are also associated in prevention and control of occupational diseases to supplement the organization's efforts in OSH protection. The focus of their activities has always been limited to unit level compliance with statutory requirements which are bare minimum. However, with increased regulatory oversight at board level and pressure from the market as well as social environment, the corporate executives as well as the managers have to consider OSH as essential part of their responsibility. In fact, under the penal

provisions of the OSHWC Code 2020, any employee including director, manager, supervisor is liable to be punished for the offences which are committed with the knowledge of or in connivance with such officials, or for negligence in duties. Therefore, all executives need to be trained in OSH relating to their area of work.

As OSH is becoming essential part of sustainability reporting, the requirements for qualified OSH professionals is likely to increase. These professionals will be required to identify OSH risks and opportunities across the company and coordinate field and unit level efforts in achieving the sustainability goals and targets. They will also be required to look beyond the company's boundary and also involve the whole value chain of the business operations.

The OSHWC Code has also reduced the threshold for appointment of safety officers from 1000 workers earlier under the Factories Act 1948, to 500 or more workers in case of factories, 250 in case of hazardous factories and construction works and 100 or more in case of mines. This will create additional requirement for qualified safety professionals across the industries. The third party audit and certification of certain type of establishments under the provisions of the Code, is also another opportunity for OSH professionals.

Conclusions

The occupational safety and health (OSH) is recognized as a fundamental human right internationally. United Nations and other affiliated agencies like ILO, ISO, World Bank have included OSH as a priority in their strategic plans and activities. Financial markets are also attaching due weightage to OSH through sustainable investing and impact investing. The OSHWC Code 2020 notified by the Government of India have provisions which have direct bearing on the requirement of OSH professionals across all industries.

Salient Technologies Transferred to Industries by SIES IEM

Sr. No.	Areas of Consultancy	Major Deliverables
1.	Mass culturing of AM Fungi	Development of novel culture of AM fungi for mass application Development of lab for culturing of AM fungi and other biofertilizers
2.	Ethanol Production from Rice Industry Waste	Ethanol extraction from rice industry waste
3.	Treatment of leachate from Hazardous Waste	Low cost efficient technology for leachate treatment from hazardous waste management facility
4.	Disinfection of Ballast Water	Low cost disinfection techniques for ballast water
5.	Sewage Treatment / Recycling Plant	SBR model for the treatment of sewage waste
6.	CO ₂ sequestration studies of afforestation projects	On site monitoring, data collection, interpretation and validation
7.	Water and energy auditing	Identification of potential losses and defining strategy for conservation
8.	Solid Waste Management	Characterization of waste, strategies for waste management and efficient technologies

EMERGING OPPORTUNITIES FOR PROFESSIONALS IN BIODIVERSITY SECTOR IN POST COVID- 19 ERA

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Biodiversity is a complex and multifaceted resource that enters every realm of human endeavor: politics, economics, social, environmental, culture and religion: past, present and future. India is one of the 17 mega diverse countries in the world and enriched with different ecosystems viz. forest, desert, coastal, wetlands, grasslands etc. It is home to 7.6% of all mammalian, 12.6% of all avian, 6.2% of all reptilian, 4.4% of all amphibian, 11.7% of all fish, and 6.0% of all flowering plant species. Different ecosystem services and functions of biodiversity provide significant environmental, economic and social benefits to human being. Approximately 65.53 per cent of population lives in rural areas, and at least 25 per cent of their income depends on profits from natural resources. Between 50 and 90 per cent of the GDP comes from ecosystems and natural goods. Biodiversity is a fundamental component of business in the world. But at the same time, business and industries can have major negative impact on the biodiversity. In current scenario biodiversity is both cause and savior for Pandemic. The article critically examines the causes of corona pandemic and opportunities for professionals in post Covid-19 era.

Major Causes of Corona Pandemic

Corona viruses are a group of viruses that can cause disease in both animals and humans. The severe acute respiratory syndrome (SARS) virus strain known as SARS-CoV is an example of a corona virus. SARS spread rapidly in 2002–2003. The new strain of corona virus is called severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) that cause corona virus disease COVID-19. Corona viruses are common in certain species of animals, such as cattle and camels. Although the transmission of corona

viruses from animals to humans is rare, this new strain likely came from bats, though one study suggests pangolins may be the origin. Some reports trace the earliest cases back to a seafood and animal market in Wuhan, China. It May have been from here that SARS-CoV-2 started to spread to humans. With developmental activities pressure on natural habitats is rising and is changing the dynamics of environmental system and health. The occurrence of pandemics due to human associated activities is the main cause of Covid 19. The major causes are listed below:

i. Deforestation and changes in land use systems

The rampant deforestation and changes in land use systems is affecting the ecosystem dynamics and causing pandemics. The reasons why this disruption of the natural habitat helps spread disease are multifaceted. "Perhaps the most obvious is habitat disturbance can cause the animals to move greater distances, carrying their pathogens with them, explains Ostfeld, adding, "Habitat destruction and degradation can reduce the health of these animal hosts which in turn compromises their immunity and allows pathogens to spread."

ii. Destruction of Biodiversity

The land use change and associated migration of animal species changes the biodiversity in that area that disrupts the predator - prey balance. "When predators disappear, often their prey, such as rats and mice increase". Rats and mice are the sources of many

of the pathogens that jump from wildlife to humans.

iii. **Climate Change**

Due to changing climatic conditions, rising temperature and irregular rainfall pattern, the variations in the life cycle of plant species is expected that may further exacerbate the situation by pushing animal populations to move into different areas, and by compromising the health of animals through reduced range of habitat and/or less-than-ideal climatic conditions.

iv. **Animal Trade and Unsanitary Conditions**

All over the world large percentage of population sustain on animal based food from domestic as well as wild animals. But in various parts of the world, the way animals are captured, transported, housed and killed poses great risks. "Both wet markets and the wild animal trade have been implicated in species jumps and epidemics". These animals are snatched from their natural habitats and transported surrounded by other animals, wild and domestic, and people in crowded conditions. The viruses inhabiting on displaced animals gets ample of scope to change the host and cause harmful diseases.

Emerging Opportunities in Biodiversity Conservation and Management in Post Covid - 19 Era

Ever since the Covid- 19 interrupted our normal life, this crisis has been pushing us to do things differently. We need to redefine our methods of biodiversity conservation and reframe policies for their sustainable management. The biodiversity sector is very vast; it involves variety and variability on the earth that is prerequisite for maintaining the balance between demand and supply of resources. There will be

huge responsibility on trained professionals to innovate new paradigms in the characterization of biodiversity, identification of novel molecules and promote sustainable business. The emerging opportunities for professionals in biodiversity sector will be as below:

- **In identification of viruses in wildlife globally and identify potential threats**

Global trends indicate that new microbial threats will continue to emerge at an accelerating rate, driven by our growing population, expanded travel and trade networks, and human encroachment into wildlife habitat. Most emerging viruses are zoonotic, that is, transferred between vertebrates and humans. Nearly all zoonoses originate in mammalian or avian hosts. Novel viruses usually emerge in regions where dense human populations and biodiversity intersect. Discovering and characterizing viruses in wildlife reservoirs is economically and technologically challenging. It requires good laboratories, surveillance and healthcare infrastructure. In future the demand of good laboratory and health infrastructure will be required. Moreover, trained epidemiologist and biosafety experts will be in demand in post Covid- 19 era to identify hotspots of viral diseases and define strategy for control.

- **In bioprospecting of molecules having medicinal properties**

The bioprospecting of plants and other living organisms for novel drugs supports pharmaceutical industries, government as well as local people by providing them ownership of the biological resources. In post Covid – 19 era the reliance on nature based solutions will further increase to identify active ingredients of drugs that is effective in treating deadly diseases with less harmful effects. Besides the accessibility of the plant material, also its quality is of great importance. Available plant material often varies on quality and composition and this can hamper the assessment of its therapeutic claims. The

chemical composition is not only dependent on species identity and harvest time, but also on soil composition, altitude, actual climate, processing, and storage conditions. Moreover, during extraction, as well as during the isolation processes, transformation and degradation of compounds can occur. From drug discovery to commercialization intensive clinical trials are required. So, the active involvement of pharmacist, botanists, microbiologists and medical doctors will be required to bridge the gaps in the knowledge and supply of raw materials for manufacturing of drugs. Also, the role of local communities will be immense in recording their traditional wisdom in people's biodiversity register through trained voluntary organizations and self help groups.

- **In conservation of biodiversity**

When a plant becomes commercialized as a herbal medicine or when one of its constituents starts getting used as a pharmaceutical drug, its populations become threatened due to extensive wildcrafting and unsustainable harvesting techniques. Further, local communities also feel cheated due to overexploitation of their resources. Effective implementation of policies for the access to biodiversity, benefit sharing and conservation is required. This needs proper mechanisms for the awareness generation among different stakeholders. Further, requirement of experts in policies, law and conservation practices will increase in future.

- **In climate change mitigation**

The impact of climate change is expected to be enormous on the life cycle of plants and

animals, growth patterns and fluctuations in the concentration of active ingredients having medicinal properties. This will require extensive studies on wild plants and animals for the identification of strategies for mitigation of impacts of climate change. In this regard multifocal, multilocal and multidisciplinary studies will be required.

- **In promotion of biodiversity friendly trade**

Linkages of trade, biodiversity and sustainable development goals will be a better route for ensuring sustainable management and conservation of biodiversity. In this regard the role of business and industry will be immense in defining biodiversity friendly pathway in exploitation of resources as well as in their conservation as per National Biodiversity Action Plan of MoEFCC, GoI. The requirement of trained professionals in the areas of business, biodiversity conservation and sustainability will increase further.

Our government is promoting use of local products and medium and small scale industries based on local resources. In this regard voluntary organizations have to play major role in the identification of opportunities, up skilling of knowledge and commercialization of products with government institutions. Professionals having multiple skills, interdisciplinary knowledge and acumen to identify need base technologies will further have vast opportunities to explore in post Covid- 19 era.

All previous issues of 'The Environment Management' can be viewed at: [http:// www.siesiem.edu.u](http://www.siesiem.edu.u)

A POLICY DRIVEN APPROACH TO BUILD RESILIENT AND SUSTAINABLE FUTURE-POST COVID

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Responding to the crisis triggered by COVID-19, policy planning offers a significant opportunity to build a more resilient and sustainable future¹.

A green recovery is crucial as we come out from the Covid-19 crisis. The world will gain economically, environmentally, and socially by converging on clean energy. "Aligning economic stimulus and policy packages with climate goals is crucial for a long-term viable and healthy economy²." Government policies must be put in place to avoid an investment hiatus in the energy transition (Fatih Birol)².

Renewable energy could power the economic recovery from Covid-19 by spurring global GDP gains of almost US\$100 trillion (NZ\$165 trillion) between now and 2050, according to a report. Investing in renewable energy would deliver global GDP gains of \$98 trillion above a business-as-usual scenario by 2050 by returning between \$3 and \$8 on every dollar invested.

It would also quadruple the number of jobs in the sector to 42 million over the next 30 years, and measurably improve global health and welfare scores. Renewable energy can help curb the rise in global temperatures by helping to reduce the energy industry's carbon dioxide emissions by 70 per cent by 2050 by replacing fossil fuels. Renewables could play a greater role in cutting carbon emissions from heavy industry and transport to reach virtually zero emissions by 2050, particularly by investing in green hydrogen².

As countries look to give their economies a much-needed jolt in the wake of the COVID-19 outbreak, governments and companies considering stimulus packages essentially have two choices³:

1. They can lock in decades of polluting, inefficient, high-carbon and unsustainable development, or
2. To use this as an opportunity to accelerate the inevitable shift to low-carbon and increasingly affordable energy and transport systems that will bring long-term economic benefits.

The latter will also fight two major crises head-on: air pollution and the growing climate emergency.

The governments of developing and developed countries have considered the points as listed below, while restarting the economies. The suggestions are put forward on the basis of the reports by WHO⁴, Stuff⁵, WRI⁶, Mc. Kinsley⁷, IMF⁸, UN⁹, World bank^{10,11}, OECD¹² and ET¹³ and TOI¹⁴ to address the entire spectrum of economy that has suffered due to COVID- 19.

The recommendations include, but are not limited to the following aspects:

1. Jobs:

Securing workers jobs and incomes by introducing support to laid off workers or those whose wages are cut, training programmes-skill development, Establishing temporary work programs for unemployed migrant workers, Securing jobs while avoiding unconditional subsidies to polluting activities, Forest and landscape restoration, watershed protection, better crop yields, forest products which would promote Local production, local jobs, Investment in small businesses, enacting debt relief measures for businesses and individuals.

2. Poverty:

Fiscal and monetary stimulus measures, Stimulus package like-MANREGA (India), Productivity safe net programs and targeted social safety nets, Seeking support from developed countries and international financial institutes, exchange ideas on stimulus measures through existing mechanisms under SAARC, Expanding income support to sick workers and their families, extending or easing access to unemployment benefits, supporting workers who cannot work from home, including through offering care options, easing access to targeted benefits or

providing a one-off universal income transfer, Reforms for pro-poor growth in developing economies, Tackle challenges of food security and creating community assets for water supply, Efforts to improve investment climate including cutting red tape affecting business and digitization of public services, Promoting women empowerment and small enterprises (MSMEs), Investing in global cooperation's and institutions, Adopt expansionary fiscal policies combined with monetary stimulus to keep credit flowing in the economies, Governments to adopt temporary spending measures and coordinate with international financial partners to avoid unsustainable long-term debt levels and fiscal deficits. Access to low cost financing and flexibility on deadlines for incentive measures, Financing through World bank and other institutes, to help private companies and preserve jobs and Financing through IBRD, IDA etc. for financial and technical support for health response. *(India has rolled out a Stimulus package (0.8% of GDP)-food, cooking gas, cash transfer to low-income household, insurance coverage for workers in healthcare sector, wage support to low wage workers, easing criteria for receiving benefits in event of job loss).*

3. Tax:

Tax cuts, reforms, cash transfers and subsidies, Creating new tax rates for fuel, energy and providing different incentives to reduce carbon emissions, revise subsidies and redirect the resources to more efficient ways to reduce poverty and boost growth, Tax credits, readjusting domestic resources and raising taxes, Taxing bad and supporting good, incentivize investments in renewable energy, energy storage and efficiency, easing of tax compliance burden across range of sectors, postponing of tax filing and other compliance deadlines.

4. Disaster Management:

Access to food, shelter and other basic needs , subsidized loans or public guarantee, ensuring liquidity for viable firms, Bringing social protection instruments, building resilience to

future shocks through improved healthcare system, support from multilateral development banks and IMF, Risk management development policy loan, strengthening institutional framework for disaster risk management, Promotion of integrated hazard and risk analysis in physical planning and supporting policy framework, development of multilayer investment plans for risk reduction and retrofitting of important buildings to make them energy efficient, comfortable and healthier, Implementation of an emergency cash transfer program during shocks, Investing in underdeveloped and over stretched health systems, targeting a gradual increase in public health spending, investing in technologies to improve public health efficiency and health infrastructure.

5. Sustainability:

Renewable energy, protection of local ecosystem and biodiversity, improving education, health, remediation of polluted lands, investment in water treatment and sanitation, sustainable transport, Stop building new infrastructure and capital assets, transition to low carbon economy, Integration of environmental and equity considerations into economic recovery and stimulus process, Restoration of nature, massive government investments in infrastructure, technology and business bailout aligning to stabilize climate system, preserve biodiversity and ensure water security.

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SIES Indian Institute of Environment Management

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SIES Indian Institute of Environment Management is conducting “River Biomonitoring and Indexing of 56 Rivers of Maharashtra on 156 National Water Monitoring Program Stations for Maharashtra Pollution Control Board”



Team MPCB Project

Induction and Training for Project Staff of MPCB Sponsored Project



Workshop on River Biomonitoring and Indexing for Pollution Management Conducted on 28th November, 2021

Details of Workshop

River Biomonitoring in Maharashtra

Dr. Y. B. Sontakke, JD- WPC, MPCB, Mumbai (M. S.)

Current Trends in Biomonitoring and Indexing of River Ecosystems for Pollution Management with perspective to Zooplanktons

Prof. Kareem Altaff, AMET Deemed to be University, Kanathur, Chennai (TN)

Biomonitoring and identification of Diatoms in River Ecosystem

Dr. Karthick Bala, Agharkar Research Institute, Pune (M. S.)

Biomonitoring of Benthic Invertebrates in River Ecosystems

Prof. Vipin Vyas, Barkatullah University, Bhopal (M. P.)

Discussion, feedback and Vote of Thanks



Some glimpses of “River Biomonitoring and Indexing of 56 Rivers of Maharashtra on 156 National Water Monitoring Program Stations for Maharashtra Pollution Control Board”



Sampling of Benthos



Analysis of Physicochemical Parameters



Sampling of benthos by Kick Method



Sampling of Zooplanktons



Sediment Sampling



Separation of Benthos from Sediment

Environment in News	
<p>Globe - trotters are willing to fly less after Covid – 19 to help climate More than two-fifths of the global population would be willing to fly less even after pandemic restrictions ease, according to a survey that shows a growing belief that individual actions impact the climate. The poll of more than 30,000 people by the European Investment Bank shows 72% of Europeans and Americans and 84% of Chinese people think their own behavior can make a difference in tackling climate change, up by between 7 and 12 percentage points since last year</p> <p>Has COVID-19 really helped the environment? The data issued by NASA from space photographs, indicates that the Earth has visually changed. This is in terms of air pollution is diminishing, water quality is improving, and snow is becoming more reflective. One way to explain this is through travel restrictions. Transport makes up 23 percent of global carbon emissions during 'normal' times. These emissions have dropped in the short term in all countries. On other hand very high demand for disposable medical products in the wake of the pandemic has created a deluge of medical waste. In China, as an example, the volume of medical waste has risen from 40 to 240 tons a day, on average. It is difficult, at this stage, to objectively assess the environmental evidence. There are positive and negative aspects, and in time we will be able to form a clearer picture</p> <p style="text-align: right;">Digital Journal</p>	<p>Advisory Board President Dr. V. Shankar Honorary Secretary Mr. M. V. Ramnarayan Joint Honorary Secretary Prof. K. Venkatramani Honorary Treasurer</p>
<p>Global sales of electric cars accelerate fast in 2020 despite of pandemic Global sales of electric cars accelerated fast in 2020, rising by 43% to more than 3m, despite overall car sales slumping by a fifth during the corona virus pandemic. Tesla was the brand selling the most electric cars, delivering almost 500,000, followed by Volkswagen. Sales of electric cars more than doubled in Europe, pushing the region past China as the world's biggest market for them.</p> <p style="text-align: right;">The Guardian</p> <p>Diversification of Indian agriculture amid the corona- 19 pandemic According to industry estimates, the number of agri tech startups in the country has reached more than 1000 startups in 2020 from 43 startups in 2013. Furthermore, the industry data suggests – the Indian agri tech market is projected to cross \$24.1 billion by 2025. It is clearly visible that the sector's growth is driven by increased penetration of the internet and smart devices in rural areas. Additionally, the emergence of tech-oriented startups in the domain has created a rippled effect that has helped in gaining resilience during the COVID crisis. Further, the Government of India also responded profoundly to help farmers navigate through the crisis. More innovative solutions were introduced in the country to drive the sector during and post COVID world.</p> <p style="text-align: right;">BusinessWorld</p>	<p>Articles are invited for next issue (January - March, 2021) of the Newsletter on the theme, 'Ecopreneurship'</p>