

Title: **ENVIRONMENTAL REGULATIONS IN A POST PANDEMIC WORLD**

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INTRODUCTION¹

During the course of their interaction with environment, humans have been able to devise ways to utilize various natural resources and modify them for their advantage. However, human encroachment as regards biodiversity has increased manifold and has affected the environment in unprecedented ways. Various diseases like Ebola, Swine flu and the latest being COVID-19 have been transmitted to humans causing widespread distress and loss to humans. There is a two-fold problem that the world is currently facing, namely *first*, the transmission of infectious viruses to humans due to the increase in deforestation; and *second*, the introduction of harmful genetic material into the food chain which might have unknown consequences for all inhabitants of the Earth.

The advent of COVID-19 has affected the global world in a variety of ways. In the times to come, it will change the way humans look at growth and development and will affect the way in which nature and non-human world is treated. Worldwide, there is a sense of fear of the unknown which has inculcated a sense of precaution in human interactions with nature. An established principle of environmental law, the precautionary principle (“Principle”) posits that when there is any uncertainty regarding adverse environment consequence of any activity, it is preferred to assess any activity properly rather than wait for unfavorable outcomes in the aftermath. Therefore, amidst this fear and uncertainty, there is a need to incorporate the Principle in all spheres of life especially human interaction with the environment. Such an adoption would require modification of the Indian regulatory framework in the post-pandemic world to prevent an irreversible and greater harm to mankind.

This paper will look into the evolution of this Principle in India and also highlight the failure in taking preventive measures to combat climate change. It will then examine the complex

¹ Harshi Misra and Prithvi Joshi have authored this paper. This paper was commissioned for LAWASIA by the Anil Divan Foundation.

relationship as regards loss of biodiversity, climate change and increase in the occurrence of pandemics.

It is quite evident that environmental degradation which increases global warming also fosters pandemics. Similarly, climate change and pandemic aggravate the effects of each other. There is a pressing need to incorporate the Principle in the policy decisions regarding the climate crisis which will also prevent the occurrence of pandemics in the future.

Further, with the advancement of technology, humans have developed methods to introduce genes into plants. For their commercial benefit, genetically modified crops have been incorporated into the market. However, it is believed that there might be some unintended medical effects by consuming them. Thus, there is a dire need to regulate the cultivation and circulation of the same and develop a framework which incorporates preventive measures to promote biosafety.

Lastly, the need of intervention to protect indigenous people and the traditional knowledge possessed by them will be explored. Traditional knowledge is considered to be an important source of information regarding various natural resources. With the intention to gain financial benefit, this knowledge and the related practices have been adopted by big corporations without recognizing the contribution of the indigenous people. In times of a pandemic, the very existence of such communities and their precious knowledge is under the risk of complete extinction. Therefore, there is a need to adopt preventive measures and establish a regulatory mechanism to protect their cultural and financial rights.

This paper also proposes certain recommendations that can be incorporated in the post pandemic recovery plans to ensure sustainable co-existence between humans and nature.

I. CLIMATE CHANGE AND BIODIVERSITY CONSERVATION

The three major ecological threats that the world and its occupants are currently facing are: COVID-19, climate change and loss of biodiversity. All of them affect human life in different ways and the cause for all of them is the untrammelled human exploitation of nature. Although these threats are aggravated due to human activities, their remedies also depend on the intervention by humans.

There have been many detrimental consequences due to the global rise in temperature. The rise in sea level that increases the risk of catastrophic flooding, and shift in weather patterns that threaten food production are some of the immediate effects of climate change which have affected the entire world at an unprecedented magnitude.

Loss of biodiversity² is also another concern which requires immediate attention, especially in the wake of the pandemic. In recent times, an increasing number of diseases have been transmitted from animals to humans, the latest in the list being COVID-19.³ Such transmission of diseases follows an increasing deforestation, which is linked to 31% of outbreaks such as Ebola, Zika and Nipah viruses.⁴ It has clearly been pointed out that almost all pandemics originate in animals (mostly wildlife) and such an emergence stems from interactions among wild/or domestic animals. Transmission, then, is driven by anthropogenic changes such as deforestation and expansion of agriculture, intensification of livestock production and increased trading as well as hunting of wildlife animals.⁵ Therefore, environmental policies which reduce

² Biodiversity is defined under the Convention on Biological Diversity (“CBD”) as- “The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes which they are part”

³ Fiona Armstrong, Anthony Capon and Ro Mcfarlane, ‘Coronavirus is a wake-up call: Our war with the environment is leading to pandemics’ (31 March 2020) <https://theconversation.com/coronavirus-is-a-wake-up-call-our-war-with-the-environment-is-leading-to-pandemics-135023> accessed 25 May 2020

⁴ John Scott, ‘How Biodiversity loss is hurting our ability to combat pandemics’ (9 March 2020) <https://www.weforum.org/agenda/2020/03/biodiversity-loss-is-hurting-our-ability-to-prepare-for-pandemics/> accessed 6 May 2020

⁵ Moreno Di Marco *et al* ‘Sustainable Development must account for pandemic risk’ (2020) 117(8) PNAS 3888, 3890

deforestation and protection of biodiversity are effective in reducing wildlife contact with humans and reduce disease emergence, as a result.⁶

The effects of Zoonosis are worsened due to the air pollution which affects the air quality and the immunity of humans. A study conducted at the Stanford University revealed that climate change heavily contributed to the occurrence and the intensity of pandemics.⁷ It causes a rise in the global average temperature which creates viable circumstances for transmission of vector-borne diseases like dengue and malaria. Thus, climate change indirectly contributes to the increase in the frequency and the spread of infectious agents.

Research has also revealed that in the long run, exposure to small particulate matter present in polluted air suppresses the immunity in humans. This results in the increase in instances of deaths in COVID-19 patients.⁸ Thus, air pollution which contributes to the rise in global temperature has additional harmful effects during the pandemic. While making policy decisions regarding the response to eliminate pollution, integration of the preventive measures to combat the climate risks would also be beneficial. The steps that are undertaken to reduce global warming might be helpful in tackling the risk of pandemics.⁹ These actions include the reduction in the exploitation of forest resources, decreasing the length of delivery chains by supporting more local environmental friendly businesses, shifting from animal to plant based diet and mitigating pollution levels.¹⁰ Hence, there appears to be a strong correlation between climate change and pandemics.

Further, a study has indicated that due to global rise in temperatures as a result of climate change, the permafrost in the Arctic region will melt and release many deadly organisms. These organisms include bacteria and viruses that haven't been exposed to humans and were

⁶ *ibid*

⁷ John Vidal, "Tip of the iceberg": is our destruction of nature responsible for Covid-19? (18 March 2020) <https://www.theguardian.com/environment/2020/mar/18/tip-of-the-iceberg-is-our-destruction-of-nature-responsible-for-covid-19-aoe> accessed on 15 June 2020

⁸ Lisa Friedman, 'New Research Links Air Pollution to Higher Coronavirus Death Rates' (7 April 2020) <https://www.nytimes.com/2020/04/07/climate/air-pollution-coronavirus-covid.html> accessed on 14 June 2020

⁹ Scott (n 4)

¹⁰ Scott (n 4)

considered to be eradicated or captured in ice.¹¹ The effect of these infectious agents is unknown to humans, but scientists believe that it might introduce infectious deadly diseases like COVID-19 that threaten the entire world at an unprecedented scale.¹²

On the other hand, a community of scientists claims that there is an amplification effect which means that with an increase in biodiversity, there was an increase in the risk of disease transmission.¹³ Another source claims that areas of naturally high biodiversity may serve as a source pool for new pathogens.¹⁴ On the front of climate change, some scientists and political leaders have discarded it as a hoax¹⁵ and are against precautions to be taken to save the planet. This is also bolstered by the fact that USA had backed out of the Intergovernmental Panel on Climate Change.¹⁶

Even though an increasing amount of evidence suggests that loss of biodiversity and pollution can indeed lead to an increase in disease transmission, these two contrasting claims clearly prove that the debate is still unresolved and there is still some uncertainty. However, there is a clear threat of irreversible damage being done through such transmission and COVID 19 is a prime example of the same. The international community should come together to prepare a biodiversity negotiation to fulfill the goal of preserving 30% of global biodiversity and marine life by 2030.¹⁷ Each country will have to take responsibility to preserve and protect its biodiverse ecosystems.

¹¹ Jasmin Fox-Skelly, 'There are diseases hidden in ice, and they are waking up' (4 May 2020) <http://www.bbc.com/earth/story/20170504-there-are-diseases-hidden-in-ice-and-they-are-waking-up> accessed on 13 June 2020

¹² *ibid*

¹³ 'Does biodiversity loss leads to an increased disease risk' <https://www.sciencedaily.com/releases/2018/07/180718152240.htm> accessed 7 May 2020

¹⁴ Felcia Keesing *et al*, 'Impacts of biodiversity on the emergence and transmission of infectious diseases' (2010) 468 *Nature* 647

¹⁵ Letter to Editor, 'Don't mess with Mother Earth. Climate change is a hoax' (18 November 2019) <https://www.bradenton.com/latest-news/article237480339.html> accessed on 14 June 2020

¹⁶ Hai-Bin Zhang, 'U.S. withdrawal from the Paris Agreement: Reasons, impacts, and China's response' (December 2017) 8(4) <https://www.sciencedirect.com/science/article/pii/S1674927817301028> accessed on 14 June 2020

¹⁷ Convention on Biodiversity, Zero Draft of the Post-2020 Global Biodiversity Framework (January 2020) CBD/WG2020/2/3 <https://www.cbd.int/doc/c/efb0/1f84/a892b98d2982a829962b6371/wg2020-02-03-en.pdf> accessed on 9 June 2020

A. REGULATORY FRAMEWORK FOR MITIGATION OF CLIMATE CHANGE

Surprisingly, no statute in India deals with climate change directly. However, the most significant statutes that tackle some aspects of this problem are Air (Prevention and Control of Pollution) Amendment Act, 1987 (“Air Act”), Water (Prevention and Control of Pollution) Act, 1974 (“Water Act”), the Environment (Protection) Act, 1986 (“EP Act”) and the Biological Diversity Act, 2002 (“BD Act”).

The Air Act contains provisions to combat with climate change as it aims to maintain and control the quality of air by regulating the amount of greenhouse gases. The Central¹⁸ and State Pollution Control Board¹⁹ (“CPCB” and “SPCB” respectively) are empowered to monitor matters related to air pollution.²⁰ Further, “air pollution control areas” can be declared in places where extensive industrial activities take place.²¹ Prior consent of the SPCB is required in such areas to establish or operate industries.²² The structural functioning of the Water Act is similar to Air Act but it focuses on issues related to water pollution.

Having said, there are certain problems with the current legislative framework of the Air Act as well as the Water Act. *First*, there is an inadequate manpower to enforce the provisions in an effective manner as most of the officials are involved in the granting of consent and are unable to perform inspections and other functions.²³ *Second*, the provisions of criminal prosecution though applauded by some, have largely been an ineffective in tackling pollution and thus, the related problem of climate change.²⁴ *Third*, Indian courts are over-burdened with cases and the time taken to conclude the proceedings is unusually long. Meanwhile, the industry continues operations which cause pollution. For instance, in the case of *Uttar Pradesh Pollution Control Board v. Mohan Meakins Ltd*, the Supreme Court gave its decision in 17 years, a long duration

¹⁸ The Air (Prevention and Control of Pollution) Act 1981, s 3

¹⁹ The Air (Prevention and Control of Pollution) Act 1981, s 4

²⁰ Shanmathi R, V. Nivetha, ‘A Detailed Study on the Precautionary Principle with reference to Polluter Pays Principle’ (2018) 120(5) 4558

²¹ The Air (Prevention and Control of Pollution) Act 1981, s 19

²² The Air (Prevention and Control of Pollution) Act 1981, s 21

²³ Rajendra Beniwal, ‘Laws Relating to Prevention of Air Pollution in India-Part II’ (30 June 2014) <https://www.indialaw.in/blog/blog/law/laws-prevent-air-pollution-india-part-2/> accessed on 15 June 2020

²⁴ Adil Wani, ‘Air Pollution: a critical appraisal of existing laws in India’ (25 April 2016) <https://environlaw.wordpress.com/2016/04/25/air-pollutiona-critical-appraisal-of-existing-laws-in-india/> accessed on 15 June 2020

during which much damage to the environment was done.²⁵ *Fourth*, there are other shortcomings including the lack of statutory power to levy fines with the Boards. The Boards can only instruct the violating industries to be closed. It might provide a short-term remedy to pollution but it would have many adverse social and economic consequences.²⁶

Fourth, there is utmost resistance in adopting new clean technologies by industries due to the costs attached with it. Industries prefer to continue working and paying the minimal fines rather than incorporating some clean sources of energy in their existing model.²⁷

The EP Act was implemented to plug the loopholes in Air and Water Act. It focuses on the preservation and development of the environment.²⁸ The central government has been given immense powers under this legislation to preserve and protect the existing biological diversity.²⁹ One of the most significant parts of all these environmental legislations is public participation which would promote a thorough analysis of costs and benefits present in any proposition. This would also prevent overexploitation of resources and help in conservation of biodiversity. However, this significant aspect, although mentioned in the legislations doesn't materialize in practice. *First*, the new Environmental Impact Assessment notification ("EIA") is a prime example wherein the government has completely removed the aspect of public participation which was at least a part of the legislation earlier.³⁰ *Second*, EIA has also remained contentious for the quality of reports that are generated. There are continuous court battles on the questions of inadequate baselines and biased assessments, and the independence of EIA consultants has also been doubted.³¹ *Third*, conflict of interest has been observed in the composition of Expert Appraisal Committees with some experts being present on the boards of corporations. *Fourth*,

²⁵ *ibid*

²⁶ Wani (n 24)

²⁷ Beniwal (n 23)

²⁸ The Environment (Protection) Act 1986, Preamble

²⁹ The Environment (Protection) Act 1986, s 3

³⁰ Ministry of Environment, Forests and Climate Change, 'EIA Notification' http://environmentclearance.nic.in/writereaddata/Draft_EIA_2020.pdf accessed on 26 May 2020

³¹ Kanchi Kohli and Manju Menon, 'Environmental Regulation in India' (2015) 50(50) Economic & Political Weekly 20, 21

EIA has tried to apply its mechanical approach even to newer areas like mountains and coastline and complex realities are reduced to simplistic facts.³²

The BD Act is an overarching legislation which was implemented as a part of India's efforts to comply with the Convention on Biodiversity and it aims to provide for conservation of biological diversity and equitable sharing of benefits arising out of the use of biological resources.³³ Under the BD Act, there is a plethora of laws and implementation is lax. India has at least 10 legislations and regulations in its Biodiversity Action Plan submitted to the Secretariat.³⁴ The country has been particularly concerned about granting environmental clearances to various developmental projects and it has been pointed out that there is a lack of coordination among administrative bodies under various forest and wildlife laws and they do not work in tandem.³⁵ In a lot of states, People's Biodiversity Registers ("PBRs") are not prepared which negatively affects the EIA. Moreover, the number of threatened species has increased from 988 in 2014 to 1065 in 2017 and it has been estimated that National Bio-Diversity Authority ("NBDA") is losing about Rs. 10, 000 Crores annually by not properly implementing the guidelines under the BD Act.³⁶ Further, the role of the Biodiversity Management Committees ("BMC") has been reduced to preparation of Biodiversity Registers that document local knowledge and bio resources.³⁷ The Access and Benefit Sharing Guidelines, 2014 also ignore the role of BMCs in the determination of benefits for bio resources having high economic value.³⁸ Eminent scientist Ajay Parida has pointed out that the three tier format under the BD Act has not worked at the

³² *ibid*

³³ Biological Diversity Act 2002, Preamble

³⁴ Ministry of Environment, Forests and Climate Change, 'Implementation of India's National Biodiversity Action Plan 2019' <https://www.cbd.int/doc/world/in/in-nbsap-other-en.pdf> accessed 25 May 2020

³⁵ Pushpa Lakshamanan, 'Implementation of the Convention on Biological Diversity and its Protocols in India' in Srinivas Burra and Rajesh Babu (eds.), *Locating India in the contemporary International Legal Order* (2018) 286

³⁶ V Sundaraju, 'Implement the Biological Diversity Act in its true spirit' <https://www.downtoearth.org.in/news/wildlife-biodiversity/implement-the-biological-diversity-act-in-its-true-spirit-63320> accessed 19 May 2020

³⁷ Punam Singh, 'Critical Review of Biodiversity Act, 2002' (MPhil Thesis, IIT Bombay) 6

³⁸ Balakrishna Pisupati and Shyama Kuriakose, 'Biodiversity Act: A jungle of confusion' (17 August, 2019) <https://www.thehindubusinessline.com/opinion/columns/biodiversity-act-a-jungle-of-confusion/article29112025.ece> accessed 22 May 2020

Panchayat level and there is serious lacuna at the grassroots.³⁹ BMCs haven't been set up till date in many states which make the effective implementation of the Act a far cry.⁴⁰

³⁹ <https://www.thehindu.com/news/national/Pretty-pictures-vanishing-biodiversity/article12556590.ece>

⁴⁰ <https://www.hindustantimes.com/gurugram/non-functional-biodiversity-management-committees-in-rural-areas-to-be-revived/story-rA5eFx1PzoxBkidH5kyBUM.html>

II. BIOSAFETY AND INDIA

Genetic Engineering has remained a contentious topic not only in India but all over the world. There have been proponents as well as opponents of Genetic Engineering and Manipulation (“GM”). It is contended that GM technology can increase yield, can grow crops in saline soils, and is a sure shot answer to afford protection against pest and insects.⁴¹ The most compelling argument for promoting GM crops is that it leads to a bumper increase in yield and this is supported by a growing body of evidence. In 1996, when GM crops were first commercialized, around 6 countries planted approximately 1.7 million hectares of these crops which grew to 148 million hectares in 2010. Further, farmers in some countries have witnessed as much as a 30% increase in yield.⁴² It is also claimed that GM foods are appropriate for places with unfavorable climatic conditions and droughts⁴³. These documented advantages are crucial for developing economies which face issues related to land scarcity and low agricultural yield, among others.

On the other hand, GM technology has faced tough opposition around the world. It has been contended that any novel gene in an organism could be a source of potential harm to human health as well as the environment. *First*, there is very little research conducted on the long-term effects of Genetically Modified Organisms (“GMOs”) on the environment as well as human health. Such unanticipated dangers are the greatest threat of GM technology.⁴⁴ *Second*, prominent environmental activist Vandana Shiva has raised serious concerns about the health and ecological impact of GMOs. Her organization Navdanya has been actively monitoring GM related activities and has also conducted field surveys. The conclusion arrived at by them states that the claims of the multinational companies regarding GM technology were fallacious.⁴⁵ *Thirdly*, activist Aruna Rodrigues has also been critical of GM technology. She is of the view

⁴¹ John Applegate, ‘The Prometheus Principle: Using the Precautionary Principle to Harmonize the Regulation of Genetically Modified Organisms’ (2001) 9(1) Indian Journal of Global Legal Studies 207, 224

⁴² Ademola Adenle, ‘Response to issues on GM Agriculture in Africa: Are transgenic crops safe?’ <https://link.springer.com/article/10.1186/1756-0500-4-388> accessed 18 May 2020

⁴³ AS Bawa and KR Anilakumar, ‘Genetically Modified foods: safety, risks and public concerns’ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3791249/> accessed 25 May 2020

⁴⁴ Manish Shukla *et al*, ‘Status of research, regulations and challenges for genetically modified crops in India’ (2018) 9(4) GM Crops & Food 173, 184

⁴⁵ Vandana Shiva, ‘Defending Farmers’ Seed Freedom’ (2016) 1(2) ANTYAJAA 1, 7

that the myths of bumper yields of GM crops are fast dissolving. According to her, GM crops like *Bt Cotton* and *HT Mustard* have been found to be unsustainable. Moreover, GM crops also contaminate farmers' seed stock and the toxicity will remain in perpetuity.⁴⁶ *Fourthly*, Kavitha Kuruganthi has also released references and abstracts of more than 400 peer-reviewed papers on various adverse impacts of GM Crops. According to her, "*What is needed are the eyes to see it, the wisdom to understand it and the conscience to accept it*".⁴⁷

Based on the above arguments, one can observe that there is still some uncertainty as regards the benefits and harms of GM technology. However, there is a clear anticipation of threat of irreversible damage if the harmful effects actually turn out to be true. Therefore, India should remain cautious and collaborate with the international community to deal with such situations, keeping in mind our international obligations under the Cartagena Protocol.

A. GM REGULATORY FRAMEWORK IN INDIA

The Indian Biotechnology regulatory framework is a complex structure involving several departments and several organizations in a hierarchy for review and approval of GM technology.

The principal legislation for regulating biosafety in India is the EP Act. Sections 6, 8 and 25 provide the basis for formation of biosafety rules. Biosafety in India is regulated by a hierarchical organizational structure comprising of several bodies.⁴⁸

⁴⁶ Aruna Rodrigues, 'Should we grow GM Crops' (July 7, 2017) <https://www.thehindu.com/opinion/op-ed/should-we-grow-gm-crops/article19226398.ece> accessed 17 May 2020

⁴⁷ Jyotika Sood, 'Scientists warn PM against GM contamination' <https://www.downtoearth.org.in/news/scientists-warn-pm-against-gm-contamination-42785> accessed 16 May 2020

⁴⁸ a) Recombinant DNA Advisory Committee- It which is responsible for reviewing developments in biotechnology at national and international levels.

b) Review Committee on Genetic Manipulation- This body is based out of Department of Biotechnology and is responsible for review and monitoring or safety related aspects of genetically modified organisms and is also responsible for approval of small-scale field trials.

c) Genetic Engineering Appraisal Committee- This body is based out of the Ministry of Environment and gives approvals for activities involving large scale commercial use and release of hazardous microorganisms.

d) State Biotechnology Co-ordination Committees- It is constituted by respective state governments and is responsible for inspecting and assessing damages, if any, from the release of GMOs.

e) District Level Committees- This body is headed by the District Collector and is responsible for monitoring of safety regulations in the installations engaged in the use of GMOs.

f) Monitoring and Evaluation Committee- This body is required to undertake field visits at experiment sites, assist RCGM in collecting and analyzing field data etc.

The regulatory framework is far from perfect and suffers from the following inconsistencies, viz. *first*, the present biosafety regulatory framework doesn't contain provision for public participation or inputs from social scientists, NGOs among others. For instance, if one observes the composition of the two important regulatory bodies- Review Committee on Genetic Manipulation ("RCGM") and Genetic Engineering Appraisal Committee, ("GEAC") there is no involvement of social scientists or competent NGOs having the capability of understanding the complexities and giving critical inputs.⁴⁹

Second, the Hazardous Microorganisms Rules, 1989 ("Rules") do not contain any provision for public involvement.⁵⁰ This 'top-down' regulatory environment where the government appointed bodies comprising solely of government appointed representatives has created a trust deficit between the government and public.⁵¹

Third, the rules as regards biosafety do not contain any provision regarding prior informed consent, which is one of the cornerstone provisions of Cartagena Protocol.⁵² Prior, informed consent would allow India to refuse GM foods which do not meet its safety standards and are harmful for human health.

Fourth, the organizational structure of the biosafety regulatory framework has faced criticism and the division of responsibility between the RCGM and the GEAC still remains a source of controversy.⁵³ In the *Bt Brinjal* case as well, the Department of Biotechnology came into the limelight after wrongly withholding data on its toxicity and allergenicity.⁵⁴ There were allegations of bias in the expert committee constituted by GEAC⁵⁵. The case abruptly came to a hold after a moratorium was announced by the then Union Environment Minister. Apart from

⁴⁹ Aarti Gupta, 'Governing Biosafety in India: Relevance of the Cartagena Protocol' (2000) 15

⁵⁰ Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms Rules 1989, r.4

⁵¹ A. Damodaran, 'Re-engineering biosafety regulations in India: Towards a Critique of policy, law and prescriptions' 1(1) Law, Environment and Development Journal 1, 12

⁵² Cartagena Protocol to the Convention on Biodiversity (drafted 29 January 2000, signed 15 May 2000) (Protocol) art.8

⁵³ Ashish Navneet, 'Regulatory Approach towards GM technology in India, USA and EU: A Comparative Analysis' (2019) Indian Journal of Public Administration 1, 9

⁵⁴ Suman Sahai, 'Potential of agricultural genetic engineering for food security in India: Research on transgenic food crops' (2010) 19

⁵⁵ Savvy Soumya Misra, '<https://www.downtoearth.org.in/news/how-bt-brinjal-was-cleared-2548> accessed 23 May 2020

that, a report of the Committee on Agriculture flagged certain issues such as the autonomy exercised by GEAC while granting approvals and also the underdeveloped structure of RCGM and GEAC. ⁵⁶*Fifth*, the Rules provide immense leeway to State Governments to formulate state and district level committees *wherever necessary*. This indicates a huge gap in the investigation procedure carried out by these regulatory bodies⁵⁷. Till 2004, because of this leeway, only 3 states had created State level committees, while district level committees had not been set up anywhere, thus clearly demonstrating the misuse of this provision.⁵⁸ Such lapses violate the risk management obligation of the state under Article 16 of the Cartagena Protocol.⁵⁹

Sixth, the Food Safety and Standards Authority of India (“FSSAI”), the nodal authority for commercial release of GM and processed foods has been plagued with inadequate infrastructure and limited research support on food science and risk assessment. The FSSAI has itself admitted to this scarcity of resources.⁶⁰ Further, it came under severe pressure when the Centre for Science and Environment exposed the huge market and sale of GM processed foods in the country.⁶¹ It tested 65 food products in the market and 32% of them were found to be GM-positive.⁶² Amidst this pressure, FSSAI came out with draft notifications on labeling of GM foods. The notification also faced criticism as it prescribed mandatory labelling for products with over 5% GM content.⁶³ Even after facing scathing criticism, FSSAI hasn’t notified any concrete regulations on labelling of GM foods till now.

⁵⁶ Ananth Padmanabhan, R Shashank Reddy and Shruti Sharma, ‘Modern Biotechnology and India’s governance imperatives’ (2017) 14

⁵⁷ Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms Rules 1989, r.4

⁵⁸ *Navneet* (n 53) 10

⁵⁹ Cartagena Protocol to the Convention on Biodiversity (drafted 29 January 2000, signed 15 May 2000) (Protocol) art. 16

⁶⁰ *Padmanabhan et al* (n 56) 13

⁶¹ Centre for Science and Environment, ‘Unlawful entry: Illegal GM in our food’ <https://www.cseindia.org/unlawful-entry-illegal-gm-in-our-food-8880> accessed 11 May 2020.

⁶² *ibid*

⁶³ Vandana Shiva, ‘FSSAI’s labelling rules promote unhealthy food’ <https://www.asianage.com/opinion/oped/160718/fssais-labelling-rules-promote-unhealthy-food.html> accessed 20 May 2020

III. TRADITIONAL KNOWLEDGE: CHALLENGES

Humans have been interacting with nature since time immemorial. Indigenous tribes and local communities (together referred to as “Communities”) across the globe have gained knowledge about various components of nature and passed it down through generations. This knowledge is referred to as traditional knowledge (“TK”) and constitutes cultural, regional, familial expression of Communities.⁶⁴ TK is continuously evolving and has been prospected for various purposes including cultivation, bio-medicine and bio diversity enrichment. As mentioned in the previous section, research on biological genetic material has advanced and humans have been able to successfully modify crops and produce medicinal products. Researchers often rely on TK for acquiring knowledge regarding the properties of such genetic resource.⁶⁵ Having realized the potential of TK, many corporates have been investing in research on TK. This has made TK vulnerable to exploitation for commercial profit. The international community, especially countries in the Global South have raised concerns over this misappropriation. Since TK has been preserved as a part of Communities’ cultures and has been modified by them over generations, corporations which are deriving profit out of it should be obligated to share it with such Communities.

A. NEED TO PROTECT TRADITIONAL KNOWLEDGE

Many Communities possess intensive knowledge about intricate relations among various components and characteristics of their surroundings and have developed methods of harnessing them.⁶⁶ There are three reasons which justify the need to provide legal protection to TK, viz., *first*, Globalization has led to the exploitation of indigenous resources and displacement of

⁶⁴ WIPO, Information note on traditional knowledge prepared by International Bureau of WIPO (1 August 2001) WIPO/IPTK/MCT/02//INF/3 https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=1838 accessed on 15 June 2020

⁶⁵ Janna Rose, ‘Biopiracy: when indigenous knowledge is patented for profit’ (8 March 2016) <https://theconversation.com/biopiracy-when-indigenous-knowledge-is-patented-for-profit-55589> accessed on 15 June 2020

⁶⁶ Federico Mayor, Director General of United Nations Educational, Scientific and Cultural Organization (UNESCO) (1994) http://www.unesco.org/education/tlsf/TLSF/theme_c/mod11/uncom11t01bod.htm accessed on 14 June 2020

communal knowledge into the exclusive possession of corporations;⁶⁷ *second*, the existence of these Communities is in danger due to massive exploitation of TK without their approval or sharing benefits with them;⁶⁸ *third*, preservation of traditional cultural identity of the Communities.⁶⁹

Not just the TK, but the Communities also need to be protected since they become especially vulnerable during breakout of infectious diseases. Since the Indian markets were liberalised in the 1990s, many indigenous Communities have experienced migration of their people to urban cities that are now employed in the unorganised sector. The COVID-19 pandemic has affected the Communities in more than one way, the phenomenon of reverse migration is taking place. Due to the lack of jobs and food security many tribal migrant workers have been forced to return to their home.⁷⁰ This puts many severely endangered Communities under the threat of extinction due to the fear that these workers may transmit the virus to their native places.

Thus, the COVID-19 pandemic has worsened the conditions of the Communities as their movement is restricted, their financial resources are curtailed and their food security is diminished and the threat of complete extinction looms over them.⁷¹

B. INDIAN RESPONSE TO TRADITIONAL KNOWLEDGE

India has been a leader in advocating for an international framework for TK. It has also made significant progress for the protection of the Communities and their TK. This section will delve into the three most important legislations in this regard, viz; BD Act; Protection of Plant Varieties and Farmers' Rights Act ("Farmers' Right Act") and the Patent (Amendment) Act, 2005.

⁶⁷ SK Tripathi, 'Intellectual property and genetic resources, traditional Knowledge Folklore: International, regional and national perspectives, trends and strategies' (2003) 8 Journal of intellectual property rights 468, 477

⁶⁸ *ibid*

⁶⁹ Carlos Correa, 'Traditional Knowledge and intellectual property, Issues and options surrounding the protection of traditional knowledge' (1999) Quaker Peace & Service 6, 7

⁷⁰ Dilip Chakma, 'COVID-19 in India: Reverse migration could destroy indigenous communities' (6 April 2020) <https://www.iwgia.org/en/india/3550-covid-19-india-reverse-migration.html> accessed on 14 June 2020

⁷¹ Kiley Price, 'For indigenous peoples, pandemic poses unique risks' (14 April 2020) <https://www.conservation.org/blog/for-indigenous-peoples-COVID-19-pandemic-poses-unique-risks> accessed on 15 June 2020

First, there is no provision as regards a prior informed consent from the Communities since BMCs haven't been established at a lot of places. It can be taken from the focal authority in India, namely, prior informed consent of the NBDA before accessing biological resources and TK associated with biological resources.⁷² Moreover, when it comes to Indian applicants, the BD Act is silent on Prior Informed Consent and Mutually Agreed Terms.⁷³

Second, upon a broad overview of the BD Act and Rules along with guidelines, it can be observed that it doesn't provide a regime for the conservation of biological resources but rather focuses on providing access to resources and knowledge.⁷⁴ *Third*, the 2014 Access and Benefit Sharing Guidelines ("Draft ABS Guidelines, 2019") reiterate how the government views access and benefit sharing as a mere "financing" framework. Apart from that, the guidelines do not explain why only in some cases there is a direct payment to Communities. Further, there are no "good practices" developed to realise benefit sharing in a fair and equitable manner. Experience as well as statistics clearly highlight that funds accrued with NBDA are much less than what they should have been and as a result benefits do not automatically flow to the Communities.⁷⁵

Thus, the BD Act consists of many lacunae such as failure to provide agency to the Communities and creating a mechanism for documentation and preservation of TK.

These lacunae were made apparent in the multiple patent claims over *Ashwagandha* for its characteristics like enhancing fertility, an active ingredient in skin cream as well as healing properties in arthritis, insomnia and other mental problems.⁷⁶ Due to the lack of documentation proving TK and indigenous techniques of *Ashwagandha*, many patents were granted. However, one such patent claiming right over the properties that help in anxiety induced stress, depression, insomnia, gastric ulcers and convulsions was rejected due to the prior art objection using the

⁷² Biological Diversity Act 2002, s 7

⁷³ *ibid*

⁷⁴ *Lakshamanan* (n 35) 286

⁷⁵ Kanchi Kohli and Shalini Bhutani, 'Access to India's Biodiversity and Sharing its Benefits' (2015) 50(31) 21

⁷⁶ Kounteya Sinha, 'India beats back US firm's bid to patent Ashwagandha formulations' (27 March 2010) <https://timesofindia.indiatimes.com/india/India-beats-back-US-firms-bid-to-patent-Ashwagandha-formulations/articleshow/5728923.cms> accessed on 15 June 2020

information available from Traditional Knowledge Digital Library (“TKDL”) prepared by the Indian authorities.⁷⁷

India has implemented the Farmers’ Rights Act for protection of plant varieties in accordance with TRIPS. While the act grants exclusive right over the seeds to the breeder, it can also be used by Communities as anyone on behalf of the Community can file an application for registering a new plant. Thus, the issue of lack of access is normatively resolved.⁷⁸ That being said, the Communities continue to remain sceptical of the systems enforced by governments as they have been subject to excessive exploitation by these same governments time and again. Farmers’ Rights Act does not provide any concrete mechanism for the protection of TK held by the Communities. However, the various aspects of Communities’ interests, cultural rights and equitable compensation have been recognised by the Farmers’ Right Act.

Another important change in the Indian IPR regime has been made through certain amendments in the Patent Act which provide defensive strategy against monopoly over TK. New grounds for opposition of patent have been incorporated, namely the failure to disclose, or incorrect disclosure of the source location of the genetic material,⁷⁹ or TK that has been utilized in the innovation.⁸⁰ However, the current patent regime has failed to provide positive protection to TK due to the stringent requirements such as novelty, utility and non-obviousness.⁸¹ Further, TK has not been documented properly, thus, the claims of prior art are rejected and patents on such products are claimed successfully. Under the existing IPR regime, there have been many instances of bio-piracy due to these issues. This was evident when patent was granted over the process employed in extracting Neem oil. It also received backlash as the fungicidal characteristic of the plant was a part of the TK of Indian Communities for many generations.⁸² There is a possibility of making commercial profits while sharing benefits with the Communities. This was illustrated in the *Agrogyapacha Patent case* wherein the patent holders shared half of

⁷⁷ *ibid*

⁷⁸ The Protection of Plant Varieties and Farmers’ Right Act 2001, s 16(d)

⁷⁹ The Patents At 1970, s 10

⁸⁰ Elizabeth Varkey, *Law of Plant Variety Protection* (Eastern Book Company, 1st edn., 1997) 102

⁸¹ The Patents At 1970, s 2(1)(j)

⁸² Vibha Sharma, ‘Patent Piracy’ (17 June 2007) <http://www.tribuneindia.com/2007/20070617/spectrum/main1.htm> accessed 9 April 2018

the profits with the community by transferring it into a trust fund.⁸³ However, when the production of medicine using the plant began, dispute over the ownership of the resource arose. The Communities were not allowed to sell the plant as it did not qualify as forest produce. Thus, they were unable to avail any commercial benefit from their TK as well as the plant.⁸⁴ It is submitted that Bio-piracy results in a two sided loss, viz., *first*, appropriation of indigenous techniques and inventiveness; and *second*, creation of monopoly over stolen TK and loss of financial avenues for the continuation of the Communities by utilising their communal heritage.⁸⁵

Although these legislations provide effective tools to defend TK in the traditional IPR regime, it does not constitute a new *sui generis* system that is needed to cover the entire scope of TK.

⁸³ Roy Mathew, 'A benefit sharing model that didn't work' (18 October 2012) <https://www.thehindu.com/news/national/A-benefit-sharing-model-that-did-not-yield-desired-results/article12561312.ece> accessed on 15 June 2020

⁸⁴ M Suchitra, 'The Kani Tribe' (28 June 2015) <https://www.downtoearth.org.in/coverage/the-kani-learning-39208> accessed on 15 June 2020

⁸⁵ Vandana Shiva, 'The US patent system Legalizes Theft and Biopiracy' (28 July 1999) <https://www.iatp.org/news/biopiracy-us-patent-law-must-change> accessed on 15 June 2020

IV. PRECAUTIONARY PRINCIPLE: AN INTRODUCTION

The origin of the Principle dates back to 1984 through its formal inclusion in a German Federal Government Report to the Bundestag.⁸⁶ The influence of the Principle grown over time and it has earned recognition in many of international treaties such as the Rio Declaration, 1992 and Cartagena Protocol, 2000.⁸⁷

There is ambiguity as regards the scope and broader contours of the Principle.⁸⁸ A large number of scholars describe the Principle as a spectrum based on its applicability. A weak version of the Principle is seen to be highly pragmatic which allows regulators considerable flexibility in terms of carrying out risk assessment and taking precaution.⁸⁹ On the other hand, strong versions of the Principle state that precautionary measures should be adopted on the slightest hint of threats of harm to human health or environment and the burden of proof should be on the proponent of the technology to prove that the technology is safe to health and environment as well.⁹⁰ Further, there are four elements which form the basis of the Principle- trigger, timing, response, and iteration.⁹¹ Trigger is the initial stage of an anticipated serious harm or irreversible damage on the basis of minimum amount of scientific information, timing incorporates taking of regulatory action before a proper causal connection is drawn between the activity and potential harm. Response is the way a state reacts by way of regulatory action. It largely depends on the degree of Principle i.e. it can either be delaying of the adoption or ban of the activity altogether. However, the golden rule is that the response should be proportionate and not excessive. Finally,

⁸⁶Harry Eyres, 'How Coronavirus has led to the return of the precautionary principle' ((7 April 2020) <https://www.newstatesman.com/international/2020/04/how-coronavirus-has-led-return-precautionary-principle> accessed 7 May 2020

⁸⁷ John Van Dyke, 'The evolution and International acceptance of the Precautionary Principle' <https://www.mmc.gov/wp-content/uploads/vandyke.pdf> accessed 11 May 2020

⁸⁸ Lavanya Rajamani, 'The Right to Environment Protection in India: Many a Slip between the Cup and the Lip?' (2007) 16(3) *Review of European Community & Internal Environmental Law* 274, 282

⁸⁹ Edward Soule, 'Assessing the Precautionary Principle' *Public Affairs Quarterly* (2000) 14(4)

⁹⁰ Mike Feintuck, 'Precautionary Maybe, but What's the principle? The Precautionary Principle, the Regulation of Risk, and the Public Domain' (2005) 32(3) *Journal of Law and Society* 371, 379

⁹¹*Applegate* (n 41) 249

iteration involves taking measures to reduce the uncertainty.⁹²

⁹² *Applegate* (n 41) 254

A. PRECAUTIONARY PRINCIPLE- IS IT THE WAY FORWARD FOR INDIA?

As was pointed out initially, a sense of fear and uncertainty exists amidst the pandemic. Therefore, it is important to understand the way forward. This section would analyze whether the environmental regulations should indeed adhere to the Principle in order to cope with the uncertain future or the Principle is too extreme in its approach and would result in stifling of innovation.

The proponents of technological application are of the view that the Principle is unscientific⁹³ and hinders innovation. Their arguments are on the following lines, namely *first*, there has not been sufficient evidence presented in mainstream science till date that genetic engineering is hazardous. Further, scholars have also claimed that over a span of 130 research projects, covering a period of 25 years of research, it has been proved that biotechnology is no more harmful than the conventional methodologies.⁹⁴

Second, developing countries like India witnessed bumper production in 2002 after adoption of genetic engineering. The farmers accrued more profits and there was also a reduction in the pesticide application as a result.⁹⁵ Further, it is also contended that these technologies are the future of developing countries, especially India where farmers have small and scattered land holdings. Thus, the moratorium on *Bt Brinjal* and rejection of other GM crops is considered discouraging and such uncertainty about regulatory criteria depresses investment in both public and private sector.⁹⁶

Third, some scholars have also argued that by focusing only on one set of risks i.e. the risks highlighted by the Principle, attention is diverted from the risks posed due to lack in

⁹³ Sandhya Ramesh, 'Shouldn't have been named author of anti-GM paper: MS Swaminathan' (20 December 2018) <https://theprint.in/science/shouldnt-have-been-named-author-of-anti-gm-paper-ms-swaminathan/166537/> accessed 20 May 2020

⁹⁴ Ronald Herring, 'On risk and regulation: Bt crops in India' (2014) 5(3) 204, 205

⁹⁵ *ibid* 204

⁹⁶ Herring (n 94) 208

technological development.⁹⁷ In the Indian context, a relevant issue is the peril associated with increased use of insecticides and pesticides which might have negative impact on health as well as the irrigated land.

On the other hand, the proponents of the Principle have argued for its application and consider it appropriate to apply it in times of crisis-

The European Environmental Agency came up with two extensive reports titled *Late Lessons from Early Warnings*. The Agency drew some conclusions from the reports, viz *first*, contrary to the beliefs that Principle stifles innovation, the application of the Principle actually fostered innovation. *Second*, the false positives in the case of saccharin and swine flu actually led to a large amount of research in these unexplored fields and led to better preparation.⁹⁸ *Third*, the number of false positives was scarce and particular care was to be taken while introducing a new technology or substance at a large scale, however, flexibility in decision making needs to be adopted so as to have an informed stand on the application of a technology.⁹⁹

Scholars and environmental activists like Vandana Shiva have come out in support of the Principle, especially in such times of crisis. She suggests that amidst COVID-19, the Principle has become more vital than ever before. Further, upholding the Principle and strengthening biosafety and health regulations is the duty of the government.¹⁰⁰ Other scholars have also pointed out that the Principle should not always be assumed to be a harbinger of delays and ban on technology. The Principle is flexible to incorporate appropriate and proportionate regulatory measures in order to address the issue.¹⁰¹ Further, it is logical and even necessary to follow the Principle for sustainable development because the carrying capacity of the regional ecosystems and the global environment is largely unknown.¹⁰² Finally, the World Commission on the Ethics of Scientific Knowledge and Technology also advocated for the Principle and stated that it is the

⁹⁷ JH Adler, 'More safe than sorry: Assessing the Precautionary Principle and the Proposed International Biosafety Protocol' (2000) 35 Texas International Law Journal 173, 195

⁹⁸ European Environment Agency, 'Late Lessons from Early Warnings: science, precaution, innovation' (2013) 32

⁹⁹ *ibid* 35

¹⁰⁰ Dr. Vandana Shiva, 'One Planet, One Health: Connected through Biodiversity' (18 March 2020) <https://www.navdanya.org/bija-reflections/2020/03/18/ecological-reflections-on-the-corona-virus/> accessed 20 May 2020

¹⁰¹ Applegate (n 41) 254

¹⁰² Applegate (n 41) 246

rational decision rule which tries to examine the complex processes in nature to arrive at a wise decision.¹⁰³

The Indian judiciary has also been active in applying the Principle as a tool for sustainable development in many instances such as the famous case of *Vellore Citizen Welfare Forum v Union of India*, wherein Justice Kuldip Singh invoked the Principle from the Rio Declaration. He stated that scientific uncertainty should not be used as a reason for postponing precautionary measures. He pointed out that the onus of proof would be on the actor or developer to show that the actions are environmentally safe.¹⁰⁴ Further, the National Green Tribunal (“NGT”) has interpreted the Principle to be an integral part of the national environmental law. It has stated that the Principle should function as a statutory command to the NGT while settling disputes related to the environment. Any regulatory inaction in the facts and circumstances of the case would lead to an action by the NGT.¹⁰⁵ This clearly shows the willingness of the judiciary to apply the Principle to protect human and environmental health.

An analysis of the above arguments, keeping in mind a post pandemic scenario, clearly points out to a conclusion that a balanced version of Principle is the need of the hour. Such version would account for the amount of care and caution needed to prevent any further outbreaks and at the same time, not remain completely averse to the available and new technologies. The following sections would deal with the application of such an approach to some of the important environmental regulations in India.

¹⁰³ UNESCO ‘Precautionary Principle’ (March 2005) SHS-2005/WS/21

¹⁰⁴ Gitanjali Gill, ‘The Precautionary Principle, its interpretation and application by the Indian Judiciary’ (2019) 21(4) Environmental Law Review 292, 295

¹⁰⁵ *ibid* 296; The principle has also found mention in several other cases like *Goa Foundation v Union of India*, *Dinesh Chahal v Union of India*, *Vardhaman Kaushik v Union of India* etc.

CONCLUSION AND RECOMMENDATIONS

The research paper set out to analyse the core Indian environmental legislations in the wake of the pandemic and suggest suitable amendments to prevent the advent of future pandemics. The current pandemic has highlighted the importance of precaution and risk assessment prior to utilisation of resources. Hence, an overarching principle which should govern future environmental legislations should be the precautionary principle.

Analysing the present legislations from that lens, the paper aimed to highlight several fundamental flaws which make the Indian regulatory frameworks less effective to handle pandemics. *First*, our legislations have complex hierarchical structure with overlapping responsibilities and little coordination between departments set up under different legislations. *Secondly*, our statutory framework hasn't been designed to comply with several international obligations that India has undertaken. *Thirdly*, public participation and rights of Communities have been constantly neglected and the role of public in preventing a future pandemic has constantly been undermined. *Fourthly*, the statutes haven't been implemented in their true spirit and there is lax implementation on the ground. As a result, the paper has also attempted to provide necessary recommendations which can help in alleviating these flaws to a large extent.

A future preparedness would require that we strengthen our regulatory framework to overcome these four fundamental flaws. Keeping in mind the socio-economic impacts of a pandemic and the way it destroys Communities around the world, it is time India took these flaws seriously and made necessary amends.

Finally, for the post pandemic era, the paper has attempted to provide several recommendations to address the loopholes in the current regulatory framework.

As regards climate change and biodiversity, the following recommendations are provided-

The following steps should be considered to further the climate action plan, namely, *first*, establish the ability to assess risks from climate change which could assist in the formation of the

recovery programs for future events like the pandemic.¹⁰⁶ It would also provide insights in the financial consequences of threats due to climate change.

Second, promote green recovery plans by investing in renewable energy resources such as air and wind. Countries should avoid the tempting short term plans that depend extensively on the existing infrastructure of using fossil fuels as the primary source of energy. Such model will not be sustainable in the long term. Adoption of hybrid energy systems and incorporating more sources of clean energy is the need of the hour.¹⁰⁷ This would reduce the pressure on biological resources like fossil fuels which cause immense pollution. Further, providing subsidies to the industries involved in producing electricity using renewable resources as well as the industries using such resources might also provide a much-needed boost to green industries. Importance should also be given to making existing energy sources more efficient.

Third, ensure that the Wildlife (Protection) Act is implemented in its true spirit and there is a complete ban on the sale of wild animals in wet markets. It would aid in reducing the risk of exposure to the viruses that can be transmitted from animal to humans. Simultaneously, preventing humans from encroaching into the forests preserves the natural habitat of animals and helps in mitigating climate change as plants remove carbon from the environment.¹⁰⁸ Protecting and revitalizing of the existing biodiversity and forests is also extremely important. Thus, deforestation should be prevented and the unexploited forests should be preserved.

Fourth, a crucial way to reduce the threat of climate change and future pandemics is to recognise and protect the cultural and land interests of the Communities whose lifestyle is closely associated with forests. The United Nations' Intergovernmental Panel on Climate Change in 2019 emphasized on the importance of protecting rights of the Communities in mitigating the threat of climate change. An important step would be to amend the Forest Rights Act (2006

¹⁰⁶ Gabriel Recchia and Haydn Belfield, Opinion: Climate change, pandemics, biodiversity loss- no country is sufficiently prepared (4 November 2019) <https://phys.org/news/2019-11-opinion-climate-pandemics-biodiversity-loss.html> accessed on 14 June 2020

¹⁰⁷ Reuters, 'Rich nations must make pandemic recovery plans green: global investors' (4 May, 2020) <https://energy.economictimes.indiatimes.com/news/renewable/rich-nations-must-make-pandemic-recovery-plans-green-global-investors/75527387> accessed on 14 June 2020

¹⁰⁸ Kain Brulliard, 'The next pandemic is already coming, unless humans change how we interact with wildlife, scientists say' (4 April 2020) <https://www.washingtonpost.com/science/2020/04/03/coronavirus-wildlife-environment/> accessed on 15 June 2020

Amendment) which puts an onerous burden on the Communities to prove their right to accommodate the needs and limitation faced by the Communities. This problem was reflected in the PIL filed by wildlife activists wherein the Supreme Court had ordered for the eviction of many Communities from their forest land. Many Communities face threat of extinction as the legal regime has failed to recognise their rights.¹⁰⁹

Fifth, the urgent need is to shift the focus on competent global leadership. International co-operation should be encouraged to deal with climate risks and other global problems. COVID-19 was a global issue and normatively the world leaders should have collaborated to mitigate and prevent the spread of the virus. However, a unilateral voice guiding the efforts against the virus has failed to emerge. Climate change is a bigger underlying problem which needs to be led by capable leaders. There is an urgent need for international co-operation as unless all countries are on the same page, their efforts will be ineffective. The agreement should be headed by global leadership and preserve sustainable development while proposing a binding climate action plan.¹¹⁰

Sixth, provide manpower to the Pollution Control Boards. This would enable them to undertake the responsibility of spreading awareness about the adverse consequences of climate change. The adverse effects on the business and economy of the society should also be highlighted.¹¹¹

Seventh, efforts should be made by the legislature to synergize the BD Act with other relevant laws like the Farmers' Rights Act and the Patents Act.¹¹² Further, there should be periodic

¹⁰⁹ IWGAI, 'Urgent Alert: Forest Rights in India under Attack' (July 2019) https://www.iwgia.org/images/documents/urgent-alerts/Urgent_Alert_-_Forest_rights_under_attack_in_India_July_2019.pdf accessed on 14 June 2020

¹¹⁰ Sunita Narain, 'COVID 19: What will be the new normal' (15 April 2020) <https://www.downtoearth.org.in/blog/lifestyle/covid-19-what-will-be-the-new-normal-70458> accessed on 13 June 2020

¹¹¹ Binod Sandwar, 'Implementation of Environmental Legislations for Environmental Protection' JIPC <http://www.icontrolpollution.com/articles/implementation-of-environmental-legislations-forenvironmental-protection-.php?aid=45644> accessed on 14 June 2020

¹¹² Jorge Medaglia *et al*, 'Biodiversity Legislation Study, A Review of Biodiversity Legislation in 8 Countries' Centre for International Sustainable Development Law https://cisdl.org/public/docs/Biodiversity_Legislation_Study_CISDL_GLOBE_and_WFC.pdf accessed on 15 June 2020

review as regards the preparation of PBRs in all the states. Moreover, it should be ensured that these registers are protected against theft and misuse.¹¹³

Eighth, transform infrastructure in the existing cities to make it environmentally friendly and sustainable in the long run. Shifting to renewable energy, using more energy efficient public transport and changing the job requirement by allowing more people to “work from home” might help in reducing the burden on the ecosystems.¹¹⁴

Ninth, Public participation must be ensured at the ground level. Apart from that, the government must mandate the setting up of Biodiversity Management Committees within a strict timeframe in all states. Further, the new EIA should be reconsidered and instead of removing the component of Public Participation in the new EIA 2020, it should be strengthened for tackling future pandemics effectively. Finally, EIA should provide timely and quality risk assessment and appropriately adapt its approach to complex areas of coastlines and mountains.¹¹⁵

As regards biosafety and the way to move forward as far as GMOs are concerned, following recommendations are proposed-

First, NGOs and scholars well versed in the field of GMO should be involved to make the process of supervision and approval more effective and transparent. Article 23 of the Cartagena Protocol, to which India is a signatory, clearly specifies the obligation of making the public aware about such technology and involving them in the decision making process.¹¹⁶ Some countries like Netherlands, New Zealand etc. have developed mechanisms for public awareness and they also provide a broader stakeholder engagement involving public opinions and generating dialogues which help the countries in making rational, informed and prudent decisions, and help the countries in proceeding with caution.¹¹⁷

¹¹³ *ibid*

¹¹⁴ Dickon Pinner, Matt Rogers and Hamid Samandari, ‘Addressing climate change in a post-pandemic world’ <https://www.mckinsey.com/business-functions/sustainability/our-insights/addressing-climate-change-in-a-post-pandemic-world> accessed 25 May 2020

¹¹⁵ *Kohli and Menon* (n 31) 21

¹¹⁶ Cartagena Protocol to the Convention on Biodiversity (drafted 29 January 2000, signed 15 May 2000) (Protocol) art. 23

¹¹⁷ Dhan Prakash *et al*, ‘Risks and Precautions of Genetically Modified Organisms’ (2011) 1, 7

Second, prior informed consent must be incorporated in the biosafety regulatory framework so that a risk assessment of GM foods entering the Indian jurisdiction can be done.

Third, an independent authority for granting regulatory approvals must be established along the lines of the proposed National Biotechnology Regulatory Authority of India. It should follow a transparent process and should have full accountability with clear enumeration of functions.

Fourth, FSSAI Act and Rules must be implemented strictly to prevent any import without FSSAI's permission. Further, rules as regards labeling of GM foods must be released so that the public is informed about the GM foods that it consumes.

Fifth, there needs to be a special committee on Novel Foods as part of the Central Committee on Food Standards to assess applications on labelling of GM crops received by RCGM/GEAC and the Director General of Indian Council of Medical Research can chair that committee.¹¹⁸

Lastly, following recommendations are proposed for the protection of the rights of indigenous communities-

First, a repository of TK should be prepared.¹¹⁹ India has emerged as a pioneer in this aspect by creating the first digital library for TK.¹²⁰ Along with TKDL, the PBRs preserve the cultural and financial interests of the Communities by ensuring that the patent offices across the world are aware of the existing TK.

Second, there should be a mandatory requirement to disclose the geographical location of the materials and information used in the invention in the patent application.¹²¹ This will ensure transparency and accountability of TK in the international IPR regime.

¹¹⁸ Navneet (n 53) 13

¹¹⁹ David Livingston, 'India need an idea bank to lead world in intellectual property protection' (May 2003) 8 Journal of intellectual property rights 215, 220

¹²⁰ See <http://www.tkdل.res.in/tkdل/langdefault/common/Abouttkdل.asp?GL=Eng>

¹²¹ Generally, see TRIPS Council, *The Relationship Between the TRIPS Agreement and the Convention on Biological Diversity (CBD) and the Protection of Traditional Knowledge: Elements of the Obligation to Disclose Evidence of Benefit-Sharing under the Relevant National Regime*, IP/C/W/442 (Mar. 18, 2005)

Third, robust benefit sharing mechanisms should be implemented. Various mechanisms could be adopted such as granting joint ownership of exclusive rights with the indigenous community and sharing technology and other resources which might aid in their development.

Fourth, a *sui generis* mechanism should be adopted that affects the financial as well as cultural identities of the Communities.¹²² This would provide an opportunity to incorporate the above-mentioned preventive suggestions to ensure that the rights and cultural identities of the Communities can thrive.

Fifth, policies to incentivise small scale industries and start-ups involved in research and production of products based on TK should be enforced. Such schemes should also extend to businesses which utilize indigenous techniques that are clean and environmentally sustainable.

Sixth, an independent regulatory body must be constituted for acting as the designated checkpoint to collect relevant information related to (1) prior informed consent that has been taken from the community and (2) utilization of genetic resources.¹²³ Although the Draft ABS guidelines, 2019 have designated NBDA as the checkpoint, it is highly unwarranted and goes against the functions of NBDA.¹²⁴

¹²² International seminar on sui generis rights, 8th December 1997 (Thai network, Bio Diversity and Genetic Resources Action International, Bangkok)

¹²³ This is an important obligation to bring transparency to the work of access and benefit sharing under Article 17 of the Nagoya Protocol.

¹²⁴ Adarsh Ramanujan, 'The New (Draft) Access and Benefit Sharing (ABS) Guidelines- Part II' (9 December 2019) <https://spicyip.com/2019/12/the-new-draft-access-and-benefit-sharing-abs-guidelines-part-ii.html> accessed on 14 June 2020