





Dynamics of Modernization and Environmental Governance: A Socio-Legal Study with Reference to Indigenous Communities

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Abstract. The territoriality approach of the indigenous people across the globe enabled them to grow accustomed to the sources of survival out of the natural resources with the biodiversity of their territories and accordingly manifest their genetic confirmation of the natural selection process within their health habitat. The progressive move of advancement of human civilization commenced with a) intensified move of agricultural expansion; b) deforestation, c) rapid industrialization; d) infrastructure development, etc., that gradually led to displacement and edge out the unrivalled semi-nomadic commune lifestyles of the indigenous people. Per contra, such dynamics of modernization have been causing collective, cumulative and compounding effects on the ecosystem resulting in global warming. The impulsive move for sustainable developmental programme, though focused on the restoration of symbiotic relations with Nature, and thus both - carbon neutrality, inclusive governance framework to mitigate the inter-generational trauma, systemic discrimination and poverty among the indigenous communities etc. however, the incremental adverse effects have caused - (i) the imbalance in the rich-natural habitats of ecology, biodiversity, land degradation, etc. across the globe; (ii) leading livelihoods by the indigenous communities in a cash-economy society on relocation and resettlement; (iii) changes in the natural process of climate-changing patterns and synchrony in disease dynamics. Abiotic and antibiotic supplies for survival as a human species are not sufficient to replace the symbiotic approach to life. the present study is focused on reviewing, comparing, and critically analyzing various developmental policies on agriculture and contributing policy implications to achieve food security in India.

Keywords: Agricultural Development Policies, Food Security, Indigenous Communities, Sustainable Development

1 Modern Civilized Society & Indigenous Community Livelihood

Food, feed, and energy - the principal drivers of progressive human civilization and to make provisions for mitigating such elementary unabated gradual transgression to rich natural habitats for enlarging the hospitality for civilized societies. The aspiration to achieve the independence or sufficiency of food productivity gradually intensified the expansion of agricultural lands, increasing trends of 'mono-culture' of selected crop groups, and incremental use of chemical fertilizers, and pesticides to enhance crop efficiency in the agro-ecosystems have been adopted. To accommodate more hospitality the extraction of natural resources for industrial production purposes and infrastructure developments, pathetic waste management treatment of - agro-waste and hazardous industrial waste, chemical waste from agricultural and industrial run-offs, higher exposures and concentration of toxicants in natural ecosystems, etc., have been followed. This impulse of modernization to set modern and civilized society has become possible, initially through colonialism, that is extractive governance mechanism, and subsequently by setting the sail of a continuum of socio-economic development to ensure the matured outcomes of development. All these dynamics of systematic modernization for better future living conditions have surfaced only at the cost of gradual intervention, transgression, extraction, and piecemeal attention to protection, prevention, preservation, and conservation of the rich natural bio-diversities and natural ecosystem, natural services of eco-evolutionary processes, systemic discrimination and poverty of the indigenous communities, and separation of indigenous communities from their cultural and natural habitats. These interactions between modern society and consequential stressors have not only segregated modern society from symbiotic and eco-friendly relations with nature like the indigenous communities rather such collective, cumulative, and compounding outcomes in the natural ecosystem have put the challenges in preserving and conserving the intrinsic biological properties in the natural ecosystem.

Agro-systems: Significant expansion of harvesting lands and the process to bridge the 'increasing yield gaps' in productivity have contributed to evolving: (a) the loss of natural bio-diversity, degradation of land and freshwater, loss of ecological reserves and natural habitats of the indigenous communities, carbon emissions, climate disturbances etc.; (b) negative correlations between species richness and diversity vis-a-vis prevalence of virus infection in species-poor agro-ecosystems - that is, expands the scopes of spill-over intrusions and transmission of potential microbial pathogens and virus through the plant-populations (wild and hosts) across the agro-ecological interface; (c) under-supply, in cases, scarcity of resources of adequate food for the indigenous communities; (d) deprivation and dispossession of health habitats of the indigenous; (e) social exclusion of the indigenous people. Mechanization coupled with the use of chemical fertilizers and pesticides with the mono-culture of high-yielding crop harvesting to mitigate the magnitude of demands of food production have become homogenous practices across the globe. The risk of carcinogenic diseases caused by the deposit of chemical residues in the agricultural land and food

due to the overuse of chemical fertilizers and pesticides, besides the occupational hazards and environmental risks, has degraded the nutritional quality of grains and food safety, and posed threat to the public health¹. Consistent anthropogenic activities lead to dysbiosis and loss of resilience as widespread use of pests (for example nicotinoid pesticides that protect insect pollinators), and chemical fertilizers, have displaced the diversity and evenness of plant microbiota increasing to pathogens, pollinators, and hypermutators – directing towards pathogen outbreaks².

The excess human intervention due to the modernization of livelihood, particularly mechanization of agriculture, urbanization, etc. by altering the natural habitats has adversely affected the natural organisms and the eco-evolutionary process resulting in thereby the negative correlations between plant species richness and diversity vis-à-vis prevalence of virus infection³ in species-poor agro-ecosystems. Identification and detection of the stressors of those microbial pathogens in the diverse wild plant populations - whether biotic or abiotic is not possible⁴. Therefore, the ecological interactions of microbial pathogens and viruses through the plant populations, i.e., wild and hosts, in the context of sustainable development, enhance the scope of spill-over transmission of the potential pathogens and viruses across the agro-ecological interface⁵. The strategic move of the introduction of genetically modified crop pathogens to achieve higher yielding and food security enables the emergence of new host-specific pathogen species at different agroecosystems on a larger scale. For example, wheat blast disease emerged in the year 1985 in Brazil and led to sustained loss of crop production to the extent of between 40% - 100%⁶ reappeared in Bangladesh also caused a loss of crops more than measuring to the tune of 15,000 hectares of land⁷. Thus, single-cyclic large-scale genetically uniform monoculture (particularly, human-generated hybrid seeds) agricultural production has been perceived to be disruptive to the co-evolutionary process and thus, rendered agro-

¹ Lu, Y. *et al.*, (2015). Impacts of soil and water pollution on food safety and health risk in China. 77(2015) Environmental International: 5-15. Available at: <https://doi.org/10.1016/j.envint.2014.12.010>

² Berg, G. and Cernava, T. (2022). The plant microbiota signature of the Anthropocene is a challenge for microbiome research. 54 (2022). Microbiome 10. <https://doi.org/10.1186/s40168-021-01244-5>

³ *Ibid*;

⁴ Agrios GN. 2005. Plant Pathology. Burlington: Elsevier Academic Press

⁵ *Infra Note 2*;

⁶ Castroagudín V.L. *et al.*, (2015) Resistance to QoI fungicides is widespread in Brazilian populations of the wheat blast pathogen *Magnaporthe oryzae*. The American Phytopathological Society. 105, 284–294. Available at: <http://dx.doi.org/10.1094/PHYTO-06-14-0184-R>

⁷ Ewen Callaway. Devastating wheat fungus appears in Asia for the first time. 532(2016) NATURE.421-2 Available at <http://dx.doi:10.1038/532421a>.

systems more vulnerable⁸. The migration of such crop pathogens and viruses led to the introduction of the genomic approach to identify the new strains of hybrid crop pathogens. An experimental study has also registered while monitoring sustainable disease management that selective sweeps by some notorious plant pathogens affect the extant host plant pathogen virulence or aggressiveness by replacing them ⁹ for example, *Phytophthora infestans* (potato late blight)¹⁰, *Puccinia striiformis* (yellow rust on wheat and barley)¹¹, and *Fusarium graminearum* (head blight on wheat and barley)¹² etc. The more astonishing part is that the trajectories of such plant pathogen evolution and the traits of such strains differ with the variance of biotic and/or abiotic factors, like, genetic-relatedness, demography, and environmental traits, and cannot be predicted¹³.

The footprints of such contaminating plant pathogens, fungi, viruses, etc. in the host plant populations have been observed as due to immigration, recombination, and lack of host heterogeneity¹⁴. The genomic approach, espoused with advanced statistical methods, while studying epidemiology, has unfolded the dynamics of infectious diseases and the evolutionary trajectories, sources, and responses of pathogens in the ecology, primarily influenced by the fragmenting of natural habitats by human use of landscape, agriculture, and wildlife ecosystems¹⁵. Natural functioning and services of various ecosystems at the behest of natural processes have been affected due to changing environments and long-term preservation of those natural habitats mostly depends upon the preservation of local terrestrial biodiversity¹⁶. Loss of species-richness in local diversity due to successive domination of humans, in worst affected areas, reduction of average local richness is

⁸Serge Savary *et.al.*, 3(2019).The global burden of pathogens and pests on major food crops.Nature Ecology & Evolution: 430–439.Available at: <https://doi.org/10.1038/s41559-018-0793-y>

⁹Zhan, Jiasui, & Mc Donald, Bruce A.(2013). Experimental Measures of Pathogen Competition and Relative Fitness.Annu. Rev. Phytopathol. 2013. 51:131–53: Available at: <http://dx.doi:10.1146/annurev-phyto-082712-102302>

¹⁰Cooke DE, Cano LM, Raffaele S, Bain RA, Cooke LR, et al. 2012. Genome analyses of an aggressive and invasive lineage of the Irish potato famine pathogen. *PLoS Pathog.* 8:e1002940

¹¹ Hovmøller M, Justesen A, Yahyaoui A, Milus E. 2008. The rapid global spread of two aggressive strains of a wheat rust fungus. *Mol. Ecol.* 17:3818–26

¹² Zhang H, Van der Lee T, Waalwijk C, ChenW, Xu J, et al. 2012. Population analysis of the *Fusarium graminearum* species complex from wheat in China shows a shift to more aggressive isolates. *PLoS ONE* 7:e31722

¹³ *Infra Note.12.*

¹⁴ *Ibid;*

¹⁵ Parratt S R., Numminen. E., & Laine, A.L.,. 2016. Infectious Disease Dynamics in Heterogeneous Landscapes. *Annu. Rev. Ecol. Evol. Syst.* 47(2016) 283–306: Available at: <httpdx.doi.org10.1146/annual-Ecol Syst-121415-032321>

¹⁶ Newbold, T., Hudson, L., Hill, S. *et al.* Global effects of land use on local terrestrial biodiversity. *Nature* 520, 45–50 (2015). <https://doi.org/10.1038/nature14324>

31% 17. The reasons behind the worst bio-diversity changes have been considered due to rapid growth and drive of human population and agricultural intensification resulting in the net changes of local diversity to 2095 has been predicted to be the rapid conversion of primary vegetation and the Southeast Asian countries that are enriched with more natural and semi-natural habitat with more natural biodiversity would suffer the greatest loss¹⁸. A recent scientific has apprehended in an experimental study that like COVID-19, plant infection the silent spreading, and the presence of plant-infecting viruses may in upcoming days take the dimension of an epidemic which may seriously affect the yielding of crops and economic growth and most importantly the global food security¹⁹. Incremental accumulation of pathogens and pests in major domesticated crops has not only diluted the quality and nutritional value rather affected the production stability and availability of foods²⁰.

The increase of anthropogenic activities under the strategic principles of economic development has appreciated the pace of the natural process of climate-changing pattern²¹, and enlarging the scope of connecting the nodes of networking transmission beyond the spatial-temporal habitat of origin due to population dynamics as well as spatial synchrony in disease dynamics²². Insights of bio-medical research have established the causal relation between the spatial-temporal environment heterogeneity and transmission networks of infectious diseases hence, the public health policy has scaled up its attempts to intervene the transmission suppression - the controlling mechanism or elimination, however, the intervention costs upon the natural habitats in the guise of sustainable development and economic growth and its impact upon the spatial-temporal ecology as well as the intervention costs of control-prevention programme for the public health have hardly been accounted.

2 Socio-Economic and Health Impact upon Indigenous Communities

As referred above, changes in land use, and deforestation do not only alter and affect the ecological elements of the natural habitats rather often contribute to vector-

¹⁷ *Ibid*;

¹⁸ *Ibid*;

¹⁹ Sylvia He and Kate M. Creasey Krainer. (2020). *Pandemics of People and Plants: Which Is the Greater Threat to Food Security?* Grow More Foundation, New York, NY, USA Available at: <https://doi.org/10.1016/j.molp.2020.06.007>

²⁰ *Infra Note 11*.

²¹ Jhon Urasti Blesia. *Et al*. A braided chronology to elucidate temporalities of a mine in New Guinea. *The Extractive Industries and Society*. (15) 2023. Available at: <https://doi.org/10.1016/j.exis.2023.101300>

²² *Supra Note 1*.

transmitted infections by increasing spatial overlap²³. Moreover, such anthropogenic action of extractivists of more material and natural resources through various strategic governance as mitigating action to address the growing demands of increasing human population have been appreciating not only changes in the weather patterns, vegetation patterns, access to their localities and availability of the quality food and water due to disproportionate social treatment rather, encouraging to contribute to evolving more frequency and distribution of food-borne and water-borne diseases due to dietary changes, vector-borne diseases, morbidity factors due to weather event and heat waves, respiratory and cardiovascular diseases due to more presence of allergens in the air and downgraded air quality in the ecosystem²⁴.

The socio-historical tradition of indigenous and local knowledge associated with diverse cultural traditions regarding the adaptive processes to respond to their food systems in the context of climatic changes has been intervened by the government through its sustainable development model. The progressive move of various developmental schemes has been internally displacing the indigenous peoples from their homelands and that does not only amount to deprivation of their prescribed social rights per contra, but more extraction of natural resources also gradually substituting those encroached natural habitats with nothing as supplementary landfills, and the toxic elements, etc., thereby promoting to cause natural disaster in various localities even. Such changes in the attributes in the biophysical and climatic conditions have made a paradigm shift in the socio-cultural bonding between the indigenous communities and their natural habitats consequently resulting in gradual evolution of the negative correlation with their health and well-being. Forced relocation and resettlement from traditional homelands and governmental grants to compel them to live in an economy that appreciates their disruptive and subsistence status in the mainstream society populated by non-indigenous peoples and has been leading towards more marginalization and subject to more exploitation²⁵. For example, *Cyperus* spp (known as Sondra in India) - the medicinal plant which contains a plethora of bio-active compounds²⁶ and its extract happens to be the

²³D.Katterine_Bonilla-Aldana.*et al.* Brazil burning! What is the potential impact of the Amazon wildfires on vector-borne and zoonotic emerging diseases? – A statement from an international experts meeting. *Travel Medicine and Infectious Disease* (31) 2019. Available at: <https://doi.org/10.1016/j.tmaid.2019.101474>

²⁴ Willox, A.C. *et al.* From this place and of this place:” Climate change, sense of place, and health in Nunatsiavut, Canada. *75(3) 2012.Social Science & Medicine.* 538-47. Available at: <https://doi.org/10.1016/j.socscimed.2012.03.043>

²⁵Anderson, I. *et al.* Indigenous and tribal peoples' health:(The Lancet–Lowitja Institute Global Collaboration) a population study. *388 (2016):131-157.* Available at: [https://doi.org/10.1016/S0140-6736\(16\)00345-7](https://doi.org/10.1016/S0140-6736(16)00345-7)

²⁶ Y. Taheri, *et al.* *Cyperus* spp.: A Review of Phytochemical Composition, Biological Activity, and Health-Promoting Effects. *Hindawi Oxidative Medicine and Cellular Longevity* 2021. Available at: <https://doi.org/10.1155/2021/4014867> According to

mainstay of Sahariyas - one of the vulnerable tribal native communities having specific locales in India. They subsist primarily on collecting and selling these non-timber forest products when the demand for daily labour for harvesting is no longer needed. The unprecedented rainfall of 2021 due to climate shock unfolded the absence of readiness and mismanagement of the dam of the Sindh river²⁷ caused flood watersheds and graced the communities with poverty²⁸. Disruption to the health of the indigenous peoples, particularly mental health, has mainly been caused by to adoption of corporate colonialism and extractive as the developmental objectives of most of the developing nations²⁹.

The increasing discharge of various bio-accumulative toxicants in processing the extraction of natural resources, industrial hazardous wastes, agricultural chemical wastes, etc are some of the multiple exposures where a higher amount of concentration, over time, contributes to contaminating natural resources needed in the normal vocation of lives in all populations of the mainstream society. These, in turn, have their access to the nervous, immune and reproductive systems and renal and cardiovascular issues of the physique of the individuals, directly or indirectly. And weak implementation of waste-treatment guidelines by the enforcement agencies has left no alternatives than to arrange and make provisions for a healthy life individually and at one's cost wherein the socio-economic gaps between non-indigenous and forcibly relocated indigenous people palpably visible³⁰. It has been underlined the positive correlations between the poor social and emotional well-being and mental illness and that the social and emotional well-being conditions depend upon the individual, family, and community³¹. Displacement and forced assimilation in the social frameworks of socio-economic inequalities have appreciated the non-fulfilment

pharmacological studies it has been reported to have bioactive compounds, such as α -cyperone, α -corymbolol, α -pinene, caryophyllene oxide, cyperotundone, germacrene D, mustakone, and zierone etc. It possesses antioxidant, anti-inflammatory, antimicrobial, anticancer, neuroprotective, anti-depressive, antiarthritic, antiobesity, vasodilator, spasmolytic, bronchodilator, and estrogenic functionalities. It has traditionally been used in India in Ayurvedic treatment.

²⁷ The tributary of the Yamuna River flows through the tropical and temperate region of Uttar Pradesh and Madhya Pradesh of India.

²⁸ Available at: <https://scroll.in/article/1047635/climate-change-is-stealing-the-livelihood-of-one-of-the-most-vulnerable-communities-in-india>

²⁹ World Health Organization. (1999). The mental health of indigenous people: an international overview / Alex Cohen. World Health Organization. <https://apps.who.int/iris/handle/10665/65596>

³⁰ E Servan-Mori, *et.al.*, 13, 21(2014).An explanatory analysis of economic and health inequality changes among Mexican indigenous people, 2000–2010. Int J Equity Health. Available at: <https://doi.org/10.1186/1475-9276-13-21>

³¹ Burgess, C.P. *et.al.* Healthy country: healthy people? Exploring the health benefits of indigenous natural resource management 2005. Aust N Z J Public Health: 117-22. Available at: <http://dx.doi: 10.1111/j.1467-842x.2005.tb00060.x>.

of aspirations and needs of the indigenous peoples while attempting to cope with the societies on rehabilitation³² and that this often leads to psycho-social issues like, substance use, domestic violence etc. Being resettled in mainstream society the indigenous people generally earn their livelihoods by exerting physical labour, if not unpaid menial labours, then as migrant labourers either in, a) agricultural fields; or b) casual labourers in industries due to lack of required skill and education. Dominant drivers of industries are in majority linked to commercial agriculture or mining infrastructure development or energy sector or any commercial units, which has contributed to evolving social conflicts³³ related to dispossession³⁴, continual injustices, marginalization and utter deprivation of rights and self-determination³⁵.

In the social contexts of increasing populations and that too in a labour surplus society the indigenous peoples are to compete with the extant socially and economically non-indigenous disadvantaged groups of the society where the main source of livelihoods is cash-economy. Hence allocation of protective treatment for the indigenous people in such mainstream society is possible if the governance ecosystem has duly identified and accounted in the specific and formal registry of depository regarding their presence and beneficial socio-legal conditions as conferred through various legislations passed for their empowerment and development. The significance of the social inclusiveness programme underlies the primacy of such a formal registry of depositories to allocate their legal entitlements in mainstream society. The development-induced extractivist proposition and associated developmental processes and measures have not only deprived them of their natural habitats and natural resources but also made themselves insignificant to the contribution to the economic growth of the country's GDP. Hence their perception of insufficiency in turn causes frustration and affects their mental health³⁶ as well as in terms of social and emotional well-being indicators. In addition, in most of the South-East Asian nations, barring a few, hardly any government undertakes the sovereign obligation to provide full healthcare services to its citizens free of cost, except the primary healthcare services. Hence, in the extant governing ecosystem of the public-private model of healthcare settings accessibility, and availability of qualitative, uniform healthcare facilities, both physical and psychological illness, for indigenous

³² Swan P, Raphael B (1995). *Ways forward: national consultancy report on Aboriginal and Torres Strait Islander mental health*. Canberra, Australian Govt. Publishing Service.

³³ Scheidel, A., et. al. (2020). Environmental conflicts and defenders: a global overview. *Global Environ. Change* 63, 102104. <https://doi.org/10.1016/j.gloenvcha.2020.102104>.

³⁴ Farrell, J., et. al. (2021). Effects of land dispossession and forced migration on Indigenous peoples in North America. *Science* 374, eabe4943. <https://doi.org/10.1126/science.abe4943>.

³⁵ Bebbington, A.J., et al. (2018). Resource extraction and infrastructure threaten forest cover and community rights. *Proc. Natl. Acad. Sci. USA* 115, 13164–13173. <https://doi.org/10.1073/pnas.1812505115>

³⁶ *Infra Note 28.*

peoples is a huge taxation due to their disadvantageous economic conditions in the mainstream society. Securing the secured positions given legislations even not satisfactory due to the distance in understanding the causes of illness, particularly mental illness, and inequality behavioural patterns of the healthcare service providers and working forces in such healthcare settings, even in the governmental healthcare units. Under-representation and under-consideration of indigenous status and lack of enforcement of regional preparedness in response to such changing geographical factors of biodiversity, climatic conditions and discriminatory socio-cultural practices have endorsed incremental health inequalities amongst the indigenous peoples in comparison to non-indigenous populations of the mainstream societies.

The forcible grant to the indigenous people to the relocated place as their domicile thus contributed to economic misery and has become the point of malnutrition, infectious and metabolic diseases due to deficiencies of nutritional foods, and other zymotic diseases, etc. Such presence in forcibly relocated areas is the significant factor and stress or that made them of poor health and burden of diseases. What is more important is that lack of awareness about the significance of the right of self-determination, as is understood by the populace of the mainstream society, has kept them unorganized and alienated unless non-indigenous member-communities of the respected resettled localities have taken them within the fold of social movements for assertion of the rights of vulnerable communities who are socially and economically in disadvantageous conditions. The traditional and local knowledge on biodiversity and concomitant lifestyles of the indigenous populations to live in and dependency on sustainable utilization as well as conservation of those diverse medicinal plants, animals and other natural resources, happened to be available in rich natural habitats for their well-being and recovery from illness, have been undervalued since the dawn of the modern civilization and thus, resulting in thereby the evolution of bio-medical model of treatment for well-being.

The Convention on Biodiversity endorsed the Indigenous People and Local Communities' contribution to sustainable use and biodiversity management however, while deciding the adaptive process to achieve the same it is ultimately the non-indigenous people who hold the absolute sway in framing the implementation frameworks³⁷. Therefore, the sedentary lifestyles of the indigenous peoples in the context of changed food habits and their perspective on indigenism have appreciated the scope of biological inability to accustom to the lifestyles of other members of mainstream society and as a consequence of what they have also been subject to

³⁷ Louisa Parks & Elsa Tsioumani. Transforming biodiversity governance? Indigenous peoples' contributions to the Convention on Biological Diversity 280(2023). Biological Conservation. Available at: <https://doi.org/10.1016/j.biocon.2023.109933>

negative outcomes like diabetes, heart failure, rheumatic diseases, musculoskeletal disorders, colorectal cancer, increased risk of fracture, etc.

Environmental Governance: The correlations between severe drought and climate change and its adverse impact on crop production, dry and unhealthy soil due to nutrient immobilization and salt accumulation increasing infertility, loss of biological properties of soil etc. have long been registered in various cross-sectional studies. Under-considered anthropogenic activities in the use of land for developmental initiatives have resulted in not only changes in climatic conditions, biodiversity, and degradation of land rather have also affected the natural process in providing the natural services. The UNCCD in its 13th Technical Discussion Session to achieve the objectives of Land Degradation Neutrality has accounted that desertification, land degradation and drought (DLDD) processes have increased in the last century, affecting more than 20% of all cultivated areas, 30% of natural forests, and 25% of grasslands. Each year an estimated 24 billion tons of fertile soil is lost due to erosion in the world's croplands and about 500 million hectares of farmland globally have been abandoned due to drought and desertification resulting in major social, environmental, and agricultural constraints³⁸. On a global scale degradation of arable land has accounted for almost 25% and approximate increments of 12 million hectares each year resulting in thereby the appreciation of land prices which is almost 3%-6% of global agriculture GDP³⁹. The UNCCD Convention on Desertification and the Science-Policy Interface Report 2017 has endorsed the piecemeal attention of nations across the globe on preserving the productive potential of the land.

The elementary supply of food, feed, and fibre, even for the affluent segments of society, depends on healthy ecosystems thus, the expectation of a seamless flow of supply of such food, feed, and fibre depends upon the preservation and maintenance of these ecosystem services as well as on resilience in the face of global environmental changes⁴⁰. The significance of the indigenous population underlies in their participatory approach and invocation of traditional and local knowledge about the rich natural resources and rich biodiversity and espousing of the same in any sustainable developmental initiatives would not only be beneficial to their livelihoods and protection of cultural heritage rather orientation of the same in the progressive move of sustainable developmental programme would ensure a better future of the global citizens.

³⁸ UNCCD Land Degradation Neutrality Target Setting Programme 2016: Land Degradation Neutrality Target Setting – A Technical Guide. <https://www.unccd.int/land-and-life/land-degradation-neutrality/resources?page=4>

³⁹ *Ibid*;

⁴⁰ Orr, B.J., A.L. Cowie, V.M. Castillo Sanchez, P. Chasek, N.D. Crossman, A. Erlewein, G. Louwagie, M. Maron, G.I. Metternicht, S. Minelli, A.E. Tengberg, S. Walter, and S. Welton. 2017. Scientific Conceptual Framework for Land Degradation Neutrality. A Report of the Science-Policy Interface. United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany. ISBN 978-92-95110-59-5.

Extractive governance inherently polarizes society into different groups. The political will of the government is very crucial in promoting the mitigating actions both in letter and in spirit. For example, making legislative provisions for social inclusion, ethnic integrity, and social harmony by involving the autonomous region palpably denotes developmental initiatives however, context-specific anatomization of societal factors, like, security, harming ethnic unity, separatism etc., are structured for circulation to pool up peoples' endorsement to validate the consequential measures under legislations, they are but the contrivance⁴¹. In the healthcare policy of the nation, though some special provisions are made in the regulatory frameworks however, in reality hardly those provisions are given effect due to a lack of appropriate identification of the indigenous populations, monitoring and updation of the same, and more effective outreach to give effect to their right to health. The language perspective often creates a vacuum in the diagnostic process and addressing their health problems.

More so lack of their traditional sociocultural traits posits the challenges to addressing the mental illness also. Present initiatives of sustainable development and afforestation in particular the agro-forestry model to restore the traditional richness of natural resources of bio-diversity and eco-system, have been suffering due to ignoring and undervaluing the wild resources present in Nature. It is the indigenous and local knowledge - the prioritization of what before initiation of extraction of natural resources would have been more beneficial not only for the indigenous peoples rather to all the global citizens. It has been observed that abiotic environments have a strong influence in appreciating the relative fitness in the competition amongst the strains of plant pathogens⁴² hence, prioritizing the empowerment of indigenous populations by preserving their natural habitats with rich bio-diversity would, besides, ensuring the sustainability of biodiversity and climate-changing conditions across the globe, contribute to the sustainability of global food security as well. Social determinants that impact the health of indigenous people are more centred on the socio-historical contexts.

⁴¹ Desal, Tenzin. RULE BY LAW: CHINA'S NEW "ETHNIC UNITY" REGULATION "TAR". Feb 7. 2020. Tibet Policy Institute. Available at: <https://tibetpolicy.net/rule-by-law-chinas-new-ethnic-unity-regulation-in-tar/> Forced relocation by the gradual expropriation of pastoral lands belonged to the Mongol community, and leasing out to the mining companies, real estate developers by the majority Han Chinese despite the Tibetan Policy and Support Act, 2019 which in turn, contributing environmental pollution and degradation thereof: Available at: <https://www.iwgia.org/en/china.html>

⁴² *Infra Note 12.*

To audit and measure the proximal⁴³, intermediate⁴⁴, distal⁴⁵ determinants in the context of changing features in the environments and governance ecosystems require consistent and coherent reliable data of each country to make the comprehensive comparative studies on the right to health of the indigenous people of South-East Asian countries and to explore and identify the methods of policies to be adopted to ensure equality on health rights. There is the scope to undertake a progressive move to set up a robust digital framework to collect and preserve data on indigenous people of the countries based on various parameters like, socio-historical, socio-economic, socio-cultural, socio-political, etc. to the extent of the rights and legal status conferred upon them through various legislations relating to their empowerment, development and social inclusive programmes. The lack of such digital infrastructure for indigenous people has frustrated assessing, reviewing, analysing, executing, and monitoring the global health governance mechanism relating to indigenous people across the globe. A more in-depth journey to their traditional healthcare practices may unfold the scope and functional biotic role of natural resources in providing spatial healthcare services more effectively.

3 Conclusion

The right to health is an incidental part of the right to life and livelihood. To ensure sustainable development the preservation and conservation of the natural biodiversity, ecosystems and a resilient move towards changing environmental conditions are must. The importance of protection and empowerment of the indigenous communities would not only ensure the achievement of the object of sustainability rather the engagement of the indigenous people would enable them to adapt coping strategies for formulate the mitigating and adaptive responses and action plans to address the contemporary issues like carbon sequestration in the carbon markets, improvements in nutritional crop productivity, food security, soil preservation, climate change, an environmental stewardship model of healthy lives that is beyond biomedical indicators - a virtuous cycle between health and well-being. The result of the present study by making a systemic review of recent literature suggests that further scope of exploration decipher the interrelationship amongst the multidisciplinary aspects of sustainable development goals in response to not only the right to health of indigenous populations, and climate changes or loss of bio-diversity rather how to restore the symbiotic relationship with the nature and natural resources and make use those natural resources for the fulfilment of lives. The limitation of the instant research lies in deficiency in the availability of adequate literature providing better

⁴³ Physical environments on relocation and resettlement, scope and opportunities of employment and income, provisions for education and food security, as well as health behaviours, etc.

⁴⁴ Availability and accessibility of community infrastructure, health-care systems, availability and capacities of resources, ambience of cultural continuity, environmental stewardship, etc.

⁴⁵ Socio-cultural practices of racism, the efficacy of social inclusiveness programmes, provisions of self-determination, nature of governance, etc.

insights on the lives of indigenous communities of all major nations of Southeast Asian countries except limited English-based peer-reviewed literature.

Therefore, opportunity lies in systematic and coherent capturing of the lived experience and oral tradition of the indigenous communities to be brought forth to the local literature comprising thereof the benefits of the environmental stewardship model of living as is being led by indigenous communities, the adverse impact of climate change, degradation of land, and more so influential riders to change the governance mechanism of community upliftment besides sustainable developmental goals. In addition, in most cases the an absence of a complete registry of depositories containing consistent and coherent reliable data on indigenous communities, despite the subsisting socio-legal issues related to their vulnerable conditions across the globe except some coping strategies in natural resource usage and management. For example, the forced relocation or rehabilitation or displacement of the indigenous communities to the locations of mainstream society left no choice but to avoid the recent pandemic Covid-19 however, hardly any depository is available to provide systematic reliable data on the victims of COVID-19 across the Southeast Asian countries to make a specific study on the potential strength and weakness of immunity system of the indigenous community.

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