

Biodiversity Conservation And Overcoming Infectious Diseases Emergence In Cameroon: A Legal Perspective

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Abstract: Human relationship with nature including biodiversity however remains inextricable. Even so, humans have for long suffered from the negative effects of infectious diseases which causes though varied, may include biodiversity loss and degradation. At this juncture, one is poised to investigate some infectious diseases outbreaks, their effects upon human health and how they can be overcome. To do this, literatures have been analyzed so as to lay bare the opportunities that lie within adopted laws at the international and national levels especially in Cameroon for harnessing biodiversity conservation to overcoming and contending infectious disease outbreaks. As such, some shortcomings including weak implementation of the laws, failure to protect traditional knowledge of species and traditional pharmacopoeia have been identified among many others, with some proposals towards amelioration advanced such as the need to build strong protection around traditional knowledge and its use in the development of modern medicines, technology transfer and mobilizing resources for effective conservation of biodiversity both at the in situ and ex situ levels.

Keywords: biodiversity, infectious diseases, health, law.

I. INTRODUCTION

World War II came to an end with humanity engaging to a United Nations Charter to more than ever before remain vigilant in the maintenance of international peace and security. As such, to take collective effective measures for the prevention and removal of tensions and threats of all kinds to peace by opting to cooperate in eliminating the political, economic, social, cultural, educational, and health issues deemed likely to impair the welfare of humanity as a whole. Global and domestic legal efforts to enforcing this lofty vision still leave much to be desired. Although international armed aggressions might be minimal, other hotspots for human sufferings creep in sometimes unnoticeably. While this is so, global consensus on how biodiversity conservation ought to be satisfactorily carried out, how it should be sustainably used and how benefits accruing thereof should be equitably shared and enjoyed worldwide by humanity as a whole remained still to be attained.

While such challenges are yet to be overcome, a sort of *Pandora box* seemed to have been laid open from which prevalent and new infectious diseases among other things would appear in diverse forms, rapidly spread and affect humans causing high mortality and economic losses and slumps. Some of such diseases include: West Nile virus, avian influenza virus, the Hendra, Nipah, Hantaviruses, severe acute respiratory syndrome (SARS), Ebola and even the most recently corona virus (COVID-19) among others. These dreaded diseases are generally considered to come from outside the community, appear when the human society least expect them, sometimes unaware of their existence and so unprepared and sometimes unable to characterized and offer quick responses almost on time. For instance, when the COVID-19 began in December 2019 in Wuhan, Hubei Province of China, it was considered as pneumonia of unknown aetiology and it was only by January 2020 that China reported that the diseases was caused by a novel corona virus. With such lack of prompt awareness and recognition of the diseases, it spread like wild fire with some 416 916 first

cases reported worldwide by more than 150 countries by March 2020, just two months later. However, most if not all of the above mentioned diseases have been blamed ever since the 19th century on poverty, overcrowding, poor sanitation, and lack of access to clean water especially in urban areas. On the list of causes of such diseases, human's carelessness in dealing with nature notably biodiversity is generally being overlooked, yet, it is found to be the foundation upon which the myriad ecosystem goods and services repose. As such, despite understanding in disease causation, transmission, spread and prevention, large local, regional and global epidemics continue to occur. This kind of situation pushes one to investigate how nature including biodiversity could influence disease emergence, spread and prevention.

Biodiversity includes the variability between genes and species which underpins the ecosystem and its functioning. It enables the ecosystem to provide diverse goods and services which can improve human health conditions and wellbeing on earth. These include: the provisioning services, regulating services as well as the aesthetics. Even so, the rates at which pandemic diseases tend to devastate human health and economic situations have not ceased from pushing scientists including environmentalists to compare the earth - *man's home* to a mine shaft in which canaries are lowered to determine its safety. This is due to the fact that biodiversity loss and extinction is taking place at unprecedented rates, with pollution even more eminent as the air humans breathe, the so-called fresh air is constantly smog, contaminated to inform man that his so-called *home* is in peril and no longer safe.

Cameroon has a very rich biodiversity endowment, ranking fourth in Africa after the Democratic Republic of Congo. Even so, the rate at which loss and degradation of the same occur is a call for concern as it is estimated globally to be 100 - 1000 times natural rate, found to be detrimental not just for nature alone but also for human health use aspect too. For instance the local plant species *Prunus Africana*, commonly called *pygeum or kirah* is noted for its multiple uses in the treatment of diseases. It is a bee loving plant for the production of honey and can be powdered into tea for the treatment of influenza, common cold or catarrh, fever and headache and remains a burgeoning dietary health supplement in USA.

Some 50,000 and 80,000 flowering plants are used medicinally worldwide with top 150 prescription drugs in USA, at least 118 based on natural sources, 74% coming from plants, 18% from fungi, 5% from bacteria, and 3% from vertebrate species such as snakes or frogs. In South Asia, beyond 70% of her 1.4 billion people have no access to modern health care as they depend on traditional pharmacopeia for healthcare. Indigenous and local communities are immense reservoirs of traditional knowledge that can benefit biotechnology, agriculture, pharmaceutical development as in China, medicinal plant use dates back at least some 4,000 years, as healers have used more than 5,000 plant species. Africa remain the major source for the production of raw materials used in producing drugs against HIV/AIDS, diabetes, and diarrhea and even for the protection of crops with its myriad richness in plants, microorganisms, amoebae, and other species notably from countries such as Egypt, Somalia, Libya, and Gambia.

New pandemic diseases emergence have been on the rise as biodiversity loss increases with pathogenic illnesses becoming common, accounting for more than 60% of all illnesses caused by microorganisms to humans from zoonotic origins. Microorganisms move from animals to humans as a result of interaction with carriers or vectors especially as humans are now getting closer to the wild. Such illnesses can also be contracted through direct contact with microbes through the air (influenza), from bites (rabies), or coming into contact with contaminated body fluid such as blood. With this, Cameroonian government among others has engaged series of international agreements on the environment. She has equally embarked upon home policy for institutionalizing decision-making centres while creating enabling environment for other stakeholders to be able to carry out activities in conserving biodiversity which opportunity can be seized for addressing related health crises notwithstanding. But then, how biodiversity loss, misuse and degradation contribute to the emergence of pandemic and major diseases and how efforts in containing the diseases which largely lies within the public health sector can be liaised with efforts to conserve biodiversity remain focal in this write-up. This write-up assesses available legal instruments both domestic and foreign in conserving biodiversity and protecting human health.

A. INFECTIOUS DISEASES OUTBREAK AND BIODIVERSITY

Emergences of infectious diseases dates back since time immemorial but humans only seem to become aware of when their health is being affected. During early human colonization of the globe, the Spanish introduced smallpox and measles to the Americas through pathogens emitted by domestic animals. In this same way, African rinderpest was developed by Europeans when they introduced Asian species in 1889 into Africa. It took 10 years for the infection to be noticed in the Cape of Good Hope, extirpating more than 90% of Kenya's buffalo population and causing secondary effects on predator populations and local extinctions of the tsetse fly. These might have been considered 'no event' with lack of reporting and awareness; yet, marks the genesis for the development of cholera, influenza and other diseases long affecting Africa and other parts of the world.

However, infectious diseases from the start do not manifest as such especially when they are found in their rightful hosts. Some diseases only affect humans due to constant manipulations sometimes resulting to hosts change especially when sudden ecosystems variation takes place. Human population expansion is highly blamed for the emergence of infectious diseases, especially in areas experiencing rapid urbanization where increased encroachments into wildlife habitats are often common. Encroachments, interactions and manipulations remain key in the global emergence of the Marburg and Ebola viruses including the human immunodeficiency virus (HIV). Also, the international movement of livestock and modern agricultural practices are considered to have led to the emergence of infectious diseases including the rinderpest in Africa and bovine spongiform encephalitis (BSE) in Europe, with similar situations noticed in wildlife populations managed either *in*

situ or in captivity. Even so, biodiversity still offer the opportunity for preventing the outbreak of such diseases and enhancing human health.

B. BIODIVERSITY, ECOSYSTEM GOODS AND SERVICES, AND INFECTIOUS DISEASES LIMITATIONS

Ecosystems provide goods and services that sustain all life on the planet especially human life. These include: the provisioning, regulating, cultural and supporting services capable of improving upon human health situations on earth if the environment and such ecosystems are better conserved.

a. THE PROVISIONING GOODS AND SERVICES

As pronounced within the preamble of the CBD, 'certain human activities can significantly reduce biodiversity and the consequences of such can be exacerbated when the activities are heedlessly applied.' This account for the reason why when ecosystems are found to be subjected to severe changes, they may traverse into undesirable state or trajectories. The Stockholm Declaration has in a sort of 'early warning,' cautioned that, man-made harm may be dangerous to the environment and human health and so, the natural resources of the earth including air, water, land, flora and fauna especially the representative samples of natural ecosystems must be safeguarded through careful planning or management.

Human quest for food alone is bringing untold consequences for human health situations as through this, new diseases might crop up. This is so given that new species are being developed with yet the domestication of wild species on the rise. For instance, in the Northern part of USA, the *Lyme disease* was transmitted from the black legged ticks (*ixodes scapularis*) to humans by feeding on or coming in contact with infected hosts. In the same vein, the Rift Valley Fever (RVF), an acute mosquito-borne viral disease which affected livestock was transmitted to humans through the direct contact with the tissue or blood of infected animals as well as by mosquito bites. Also, the *African Trypanosomiasis* otherwise known as the *African sleeping sickness* estimated to cause loss in cattle production of up to 1 billion a year and even five times this amount in terms of lost opportunities for development, with close to 500,000 people still being affected yearly in Sub-Saharan Africa.

b. REGULATING SERVICES

Biodiversity plays a significant role in the regulation of the ecosystem conditions which offer humans the opportunity to lead a fulfilled life with health potentials on earth. To this effect, biodiversity offer the conditions and processes through which natural ecosystems may sustain and fulfilled human health. What remains regrettable is that humans often turn to consider biodiversity importance only in terms of the goods provided by the ecosystem which could directly be appropriated for economic and consumptive purposes. However, humans often fail to perceive and sometimes overlooked the physical, biological and chemical process

which might not be directly seen, yet constituting a major aspect that channels human health delivery better.

Biodiversity regulates and reduce air and water pollution, mitigate noise, heat and the effects of climate change and in pollination of crops. As such, forests including mangroves, coral reefs, sea grasses, kelp forests, wetlands, and dunes can mitigate the effects of some natural hazards including coastal storms, hurricanes, catchment-borne floods, tsunamis, avalanches, wildfires and landslides among others, including human interaction with the natural environment, found to be sensitive to environmental changes such as the introduction of alien species. For example, there has been high biodiversity loss most especially in oceanic islands often leading to what is generally considered as *human-mediated pathogen invasion*. In the 15th and 16th Centuries, there was massive loss of biodiversity with the appearance of diseases such as smallpox, typhus and measles in South America caused by pathogenic emission, resulting to depopulation and some 50 million deaths.

Pathogen pollution poses a substantial threat to global biodiversity. First, it has the potential to cause catastrophic depopulation of the new and native host population. Second, when introduced diseases become enzootic, initial declines may be followed by chronic population depression, and if the threshold host density for disease transmission is lowered, local extinction may occur. In some cases, the success of invading host species may be enhanced by parasite-mediated competition due to the impact of co-introduced diseases on resident species. Such diseases co-introduction may impact humans either directly or through effects on domesticated species or in *knock-on effects* - that is effects yet to be predictable in the future.

c. CULTURAL AND SPIRITUAL SERVICES

Local communities are embedded with cultural practices which though often oral have long been appreciated for biodiversity conservation. These practices are as old as mankind as they are linked to feeding habits as well as spirituality, handed down from one generation to the next. Through their knowledge, use of biological resources and culture, the emergence of certain infectious diseases can be contained with the use of taboos, plant species, fungi and animal species of various sorts.

Due to the fact that, conventional approaches to finding healthcare solutions are time consuming in the wake of infectious diseases coupled with the fact that, community health contexts require simpler and rapid assessments, traditional pharmacopoeia with the use of biodiversity may just be the magic solution, though often neglected. In this light, WHO joint efforts with IUCN and WWF in searching for appropriate ways on how to link traditional pharmacopoeia in the treatment and prevention of emerging infectious diseases is worth applauding. This can be the move toward a framework for national strategies on the conservation and sustainable use of medicinal plants.

II. FACTORS ACCOUNTING FOR BIODIVERSITY LOSS AND INFECTIOUS DISEASES EMERGENCE

Biodiversity decline as seen above measures from 100-1000 times natural rate. Paradoxically, anthropogenic factors account for such loss while humans greatly depend upon biodiversity for their livelihoods. Key anthropogenic factors include: the introduction of exotic species, destruction of habitats, and climate change among others.

A. HABITAT DESTRUCTION

The destruction and loss of habitats could generally be considered as processes by which areas inhabited by species are rendered functionally unsustainable to further sustain individuals of the species. Reasons for habitats destruction are multifaceted, reason why efforts aimed at checking the phenomenon sometimes remain almost futile if not holistic in approach, well planned and better implemented. Within the Sustainable Development Goals (SDGs), health, life and human well-being has been considered priority for sustainable management and conservation of marine and terrestrial ecosystems including forests. But then, for this to occur, rates of desertification, land degradation, and biodiversity loss must be slowed.

Worldwide, habitat destruction alone accounts for extinction of some 11% of animal species while rendering another 21% vulnerable. It constitutes the most pervasive driver of current biodiversity loss with an estimated 27 000 species ruined each year, with projections indicating that if nothing is done to reverse the trend, then by 2050 almost 37% of bird species may go extinct. In Cameroon, the *Heracles* undertook a clearing spree, destroying some 180 599 acres of dense forest near the Korup National Park in the south west region in the name of palm oil cultivation. In flagrant violation of law, the livelihoods of some 14 000 inhabitants were in peril with illegal logging the order of the day. Besides, it is this kind of undertakings that destroys biodiversity, takes humans closer to wild species while exposing local populations to health challenges with development of infectious diseases over which they lack mastery.

B. INTRODUCTION OF EXOTIC SPECIES

Humans have no doubt developed the capacity to modify the environment in countless ways. One of which is the introduction of *novo* species to design the type of ecosystem that answers to their desires. Such endeavours would hardly be blameless given that the after effects of such introduced species if not effectively harnessed, often lead to more harm than good. Scientists still face enormous challenges in identifying high risk pathogens within species, talk less of predicting geographical areas where diseases outbreaks are likely to occur or identify reservoir hosts from which pathogens would emerge and host species at greatest risk of pathogen mediated declines.

When diseases emerge, it becomes an issue for the public health sector almost exclusively. However, macroecology offers tools to understand the otherwise perplexing variation in defense strategies against parasites among host species. It is in

this light that bats were identified as source of major emerging zoonotic viruses, including SARS, Ebola, Nipah, Hendra and rabies including the corona virus ravaging human populations. Thus, the need to integrate human, animal and environmental health in a common framework as has already been invoked in 'one health' movement.

C. EXISTING LEGAL INSTRUMENTS FOR BIODIVERSITY CONSERVATION AND DISEASES PREVENTION

Laws exist both at the international and national levels for biodiversity conservation, prevention of diseases outbreaks and improving upon human health situations.

A. THE CONVENTION ON BIOLOGICAL DIVERSITY (CBD) AND CARTAGENA PROTOCOL ON BIOSAFETY

Before the adoption of the CBD, diverse international legal instruments had made the conservation of nature a central concern for humanity. The need to develop environmental conservation measures especially biodiversity which underpins human livelihoods. This is the reason why beside the need to develop national legislations to maintaining biodiversity knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles, States are supposed to be vigilant especially when it comes to the use and release of living modified organisms resulting from biotechnology which could negatively affect biodiversity. Through monitoring therefore, there is the need to identify components of biodiversity for conservation especially to buffer against infectious diseases, and the maintenance of species for medicinal purposes.

Due to population increase, agricultural expansion, infrastructure development among others humans have in some sort of a *rat-race* moving closer to the wild, interacting with, domesticating some, and in haste to consuming these wild species in yet unprecedented manner. This phenomenon had posed threats to human health through the emergence of infectious diseases and is still doing so till date. This explains the reason why barely nine years after the CBD there was need to adopt a law on biosafety. However, while this law is to control handling and use of living modified organisms which may have adverse effects on conservation and sustainable use of biological diversity relating to human health, it seems to casts doubts in this regard giving that, it would not apply to transboundary movement of modified organisms for pharmaceutical purposes, claiming that "...such shall be addressed by other relevant international organizations or agreements."

B. CONFERENCE OF PARTIES (COPS)

At the COP II of CBD, the need for linking biodiversity with human health was already established, thus, calling for the need to adopt a biosafety agreement. This link was further concretized in 2016 during COP XIII held in Cancun, Mexico under the theme *Biodiversity and Human Health*. Biodiversity

was herein recognized as the *live-wire* connected for human food provision, traditional medicines and biomedical discovery, and indirectly a source of clean water, clothes, heating and shelter, by underpinning ecosystem functioning and resilience and the provision of essential ecosystem services and by providing options for adapting to changing needs and circumstances, and to climate change. It seeks to encourage the development of inter-disciplinary education, training, capacity-building and further research programmes on health-biodiversity linkages through integrative approaches. This therefore was considered as a step forward towards the implementation of the 2030 Agenda for Sustainable Development and Sustainable Development Goals.

C. THE NAGOYA PROTOCOL, STRATEGIC PLAN FOR BIODIVERSITY, AICHI TARGETS AND THE SDGS

At the Sustainable Development Summit in 2012, there was an agreement to negotiate an international regime to promote and safeguard the fair and equitable sharing of benefits arising from the use of genetic resources so as to enforce article 8(j) and 15 of the CBD. After six years of negotiation, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity was adopted at the tenth meeting of the Conference of the Parties on 29 October 2010, in Nagoya, Japan.

The Protocol significantly advances the third objective of the CBD by providing a strong basis for greater legal certainty and transparency for both providers and users of genetic resources especially for medicinal purposes. Specific obligations to support compliance with domestic legislation or regulatory requirements of the Party providing genetic resources and contractual obligations reflected in mutually agreed terms plus the ability of communities to be recognized and could benefit from their knowledge, innovations and practices constitutes significant innovations of the Protocol.

Biodiversity conservation especially in recognizing the local communities' abilities which have no doubt cohabited with such resources over several centuries remains very relevant. As such, irrational species introduction and even consumption of yet 'unknown' species remains the craftiness of modern society. While the maintenance of unnecessary closeness, domestication of wild species and inhabiting 'sacred' ecosystems have become the order of the day, new infectious diseases are bound to arise sometimes from 'nowhere' as they remain strange with science yet to identify, classify and characterize them appropriately. With the adoption of the Strategic Plan on the conservation of biodiversity for the next decade 2011-2020, considered 'biodiversity decade' which includes a broad-base for actions to be engaged for biodiversity conservation and human health and the prevent of future occurrence of infectious diseases. This has equally been reflected in the Sustainable Development Goals (SDGs) of 2015.

D. WORLD HEALTH ORGANIZATION TRADITIONAL MEDICINE STRATEGY

Whether one accepts it or not traditional medicines otherwise considered as the sum total of the knowledge, skill and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness plays an important role in global human health care. In this regard, they are considered as *alternative* or *complementary* medicine as they are not fully integrated into the dominant health-care system. Yet, the need to conserve such species and genetic materials used in traditional medicines constitutes the entry-point through which biodiversity conservation should be channeled and solutions against infectious diseases couched for the betterment of human healthcare the world over.

The World Health Organization long realized the need for governments to include traditional medicines in classical medical treatment and launched the first global strategy to this effect in 2002-2004. This initiative was updated for the period 2014-2023 which largely devotes more attention to prioritizing health services and systems, including traditional and complementary medicine products, practices and practitioners.

E. NATIONAL LEGAL INSTRUMENTS AND PROGRAMMES

There are no doubts that Cameroon's rich biodiversity potentials and varied ecosystems constitute foundation of livelihoods for its citizens. The food, clean water, air, pollination, recreation and even belief systems offered by the ecosystems through their myriad services goes a long way to enhance a healthy living. Meaning that, keeping nature safe would mean keeping humans safe and conversely too, destroying nature would have negative health consequences upon humans. When there is diseases outbreak due to maybe the misuse and destruction of biodiversity, health actors and medics from the public spheres, private health care sectors as well as traditional practitioners including environmental scientists would come into play to act in reversing its impacts and its prevention. At this juncture, there is need to demonstrate the possibility for synergizing the above mentioned interests within the laws aimed at conserving biodiversity which can play a major role in the prevention of infectious diseases and fosters human health in the country.

a. THE CONSTITUTION

Within the Cameroonian Constitution, the People have resolved to harness their natural resources in order to ensure the wellbeing and uplift the living standard of every citizen without discrimination in a healthy environment. In this regard the State is assuming its sovereign rights over such resources including biodiversity as has been outlined in international legal instruments. As such, law-making including those related to the environment and human health is reserved to the President of the Republic and the Parliament including the

powers to sign, ratify and domesticate international legal instruments.

b. FORESTRY, WILDLIFE AND FISHERIES LAW PLUS THE NATIONAL ENVIRONMENTAL MANAGEMENT LAW

In order to effectively conserve Cameroon's rich biodiversity resources, the government has signed and ratified several international environmental legal instruments besides the adoption of national legislations. By 1994 the government adopted a law to govern the forestry sector. Within the ambit of this law, the State beside other actors constitutes major stakeholders in the ownership, management and protection of forests, forests resources including biodiversity. It is from this that comes possibilities for establishing exploitation contracts. A contract considered as an agreement in which licence - holder may be granted some rights and obligations especially when it concerns the exploitation of 'special forests produces' including biodiversity while maintaining ecological balances.

c. NATIONAL BIODIVERSITY STRATEGIC ACTION PLAN (NBSAP)

The Cameroonian NBSAP was adopted in order to address the causes and consequences of biodiversity loss in the country. Within this framework, 20 biodiversity and 10 ecosystem Targets were adopted. This policy orientation furthers to reverse and halt the current trend in the loss of biodiversity as a way to establish a strong nature base that is indispensable for the growth of the nation's economy and a better livelihood of its people. The visionary direction envisages a great change in a little over two decades and allows for an end of term assessment with the national vision for growth and employment set for 2035.

III. SOME CHALLENGES, CONCLUSION, PROPOSALS FOR IMPROVING BIODIVERSITY CONSERVATION AND COMBATING INFECTIOUS DISEASES

Human livelihood is underpinned by ecosystem services generated by biodiversity. These goods and services have the potentials to act as barrier for the emergence of infectious diseases, yet, such diseases are found to occur, spread, difficult to overcome, causing human death and economic stagnation in several parts of the world sometimes due to the fact that their occurrences are hardly linked to the manner in which humans are interfering with, using and callously depleting natural resources especially biodiversity which could act as natural barriers or sink for absorbing the shocks of diseases occurrences and their effects upon humans and communities.

Also, some diseases become epidemic and even pandemic due to the fact that they are caused by novel pathogens usually poorly understood in terms of source, spread and transmission, thereby having the potentials to cause large outbreaks. Even when such diseases are identified to come from animal sources such as influenza as a whole, ebola, the nipper virus, HIV/AIDS among others generally associated with high death

in human population there are tendencies for recurrences even if such diseases are overcome at particular periods.

The outbreak of major diseases affects humans indiscriminately from highly technological societies to lesser ones. While ascertaining that poverty, population expansion, illiteracy may be accountable to the gravity of diseases on humans, biodiversity which holds the potentials for underpinning human livelihoods must be considered beyond the environmental field else, its continuous degradation would turn to greatly increase the above mentioned human sufferings. There is need includes biodiversity conservation in every development initiatives both at national level and globally especially given that infectious diseases know no borders. This entails moving from mere sloganeering to concrete actions. Cameroon is at a turning point in the improvement of her governance system with the adoption of Law No. 2019/024 of 24th of December 2019 instituting the General Code of Regional and Local Authorities. By decentralizing decision-making centres, local communities would sure be politically integrated, economically empowered and given the opportunity freely exercise their local practices especially in conserving biodiversity, usage of traditional pharmacopoeia beside modern medicine in tackling diseases outbreak in their communities, while being encouraged to annually submit their various local health strategic indexes for national follow-up and improvement.

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