

DISCUSSING THE SOCIO-ECONOMIC AND CULTURAL IMPORTANCE OF WETLAND ECOSYSTEMS UNDER CAMEROON ENVIRONMENTAL MANAGEMENT CODE OF 1996

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ABSTRACT

This article examines the socio-economic and cultural significance of wetland ecosystems as stipulated under the Environmental Management Law of Cameroon. It discusses other benefits of wetlands, especially its role in carbon sequestration, sanctuary for migrating birds and its contribution to climate regulation, carbon storage, climate mitigation and adaptation. The article explains that the conservation of wetland ecosystems is of utmost importance to man and the environment. It argues that the Environmental Management Code of Cameroon is not without challenges as far as the management of wetland ecosystems in the country are concerned, the inadequate legal protection and the lack of human resource capacity on wetlands conservation is major problems that need to be redressed by the law. The article concludes that wetlands are a reservoir of natural resources to the population of Cameroon and so they should be protected from degradation and loss. To do this the article recommends the enactment of a law on wetlands, sensitization of citizens and the training of experts on wetland ecosystems conservation techniques.

INTRODUCTION

Wetlands are one of the most undervalued ecosystems but provide a wide range of vital services to man and the environmentⁱ. They provide significant economic, social and cultural benefitsⁱⁱ. They are important for primary products such as pastures, timber, fish, and support recreational, and tourist activitiesⁱⁱⁱ. Wetlands also help reduce the impacts from storm damage and flooding, maintain good water quality in rivers, recharge groundwater, store carbon, help stabilize climatic conditions and control pest^{iv}. They are also important sites for biodiversity^v. Section 94 of the Cameroon Environmental Management Code provides that:

Mangrove ecosystems shall be specially protected, taking into account their role and importance in marine biodiversity conservation and the maintenance of coastal ecological balances

Although the above article appears vague, taking into consideration the fact that it did not explain how this wetland should be protected, it however states that they should be protected because of their role in marine biodiversity protection and the maintenance of coastal ecological balances.

The key role that rapidly diminishing wetlands play in supporting human life and biodiversity needs to be recognized and integrated into decision-making as a vital component of the transition to a resource-efficient and sustainable world economy^{vi}. It is no accident that river valleys and coastal plains with abundant wetlands have been the focus of human civilization for over 6000 years^{vii} and that these wetland ecosystems, with their rich natural resources, have been critical to the development and survival of humanity^{viii}. Our advancing technological skills may sometimes be portrayed as enabling us to “conquer” and control nature, but recent environmental catastrophes, such as floods, landslides, storms, many with their roots in unsustainable use of land and water- suggest otherwise^{ix}. The reality is that we still depend on properly functioning ecosystems to sustain us^x.

Wetland ecosystems are part of our natural wealth, at a worldwide scale they provide us with services worth trillions of US dollars every year entirely free of charge, making a vital contribution to human health and well-being^{xi}. With the global population set to increase to

nine billion by 2050^{xii}, increasing pressure on water resources and the threats posed by climate change, the need to maximize these benefits has never been greater or more urgent^{xiii}. It is for this reasons that the government of the Republic of Cameroon decided in 1996 to enact a National Law on Environmental Management in Cameroon^{xiv} so that its environment in general and wetland ecosystems in particular will be protected from degradation and lost caused especially by anthropogenic factors.

Below we shall discuss the socio-economic and cultural importance of wetlands, other significance of wetland's ecosystems such as its ecological benefits to man and the environment will also be examine.

THE SOCIO-ECONOMIC SIGNIFICANCE OF WETLANDS

Wetlands have been, and are, the basis of community economic activities^{xv}. People who live within or around wetlands have, for a long time been involved in various economic activities and their settlement patterns have been influenced by the wetlands^{xvi}. Below are examined the various socio-economic benefits of wetlands ecosystems.

Farming

Farming activities are the major economic pursuits around wetlands with the cultivation of crops such as paddy, maize and various types of vegetables and fruits^{xvii}. The practice of growing rice in swamps is increasing in many countries of Africa, led by Egypt. Between 1974 and 1975, Tanzania produced 160.000 tons of paddy^{xviii}, and in Cameroon, the Ndop floodplain which support a total of 14 villages with a population of more than 105.000 people has have a potential of producing rice of about 1650kg for small holding and 2880kg in large holding^{xix}. Section 27 of the Environmental Management Code provides that "Flood plains shall be specially protected. This protection shall take into consideration their role and importance in biodiversity conservation". This implies that whatever activities are being carried out on the wetlands they should be done taking into consideration the natural function of the wetland ecosystem.

The farming activities in floodplains are controlled by the seasonal floods. People who live and farm in some floodplains move to higher lands during the floods and return to the valleys during the cultivation season. In fact, some people, like those in Lower Rufiji floodplain^{xx}, have developed a “two homes” system. They live in one house during the cultivation season and the other during the flood season. This type of settlement pattern has traditionally enabled the peasants to cultivate two types of crops. Some crops are planted when the areas are still wet but the water level is falling^{xxi}. The use of such seasonal floodplains allows the planting of a range of crops: paddy is planted in stagnant water as the water level falls, while quick growing crops^{xxii} are planted later in damp soil. In this way, wetlands of this type influence not only settlement patterns but economic and social activities as well. The people adapt themselves to the seasons and organize their various activities accordingly.

The disadvantage of this type of settlement pattern is that people cannot build permanent houses but must move their habitation between the floodplain and the uplands. It was on this basis that in the 1970s, at the peak of the implementation of the “ujamaa” programmes, the people in the Rufiji floodplain were moved by force to the uplands for their own safety^{xxiii}.

The ownership of land in these areas follows the traditional land tenure system. The family land, where family members have been living and cultivating for a long time, is passed to the next generation. If members of the family want to cultivate new areas, they normally follow the community-based land tenure system whereby the land which does not belong to a specific family or clan can be assigned to those in need^{xxiv}. Section 38 of the Environmental Management Law states that:

The allotment and management of land for agricultural, industrial, urban or other uses, as well as prospecting, research or exploitation of sub-soil resources likely to endanger the environment, shall be subject to the prior authorization of each Administration concerned and after the obligatory opinion of the Administration in charge of environment^{xxv}.

This is to be reassured that the agricultural activities and other uses carried on the wetlands in particular are environmentally friendly and to make sure that conflict is avoided between interested parties.

Traditionally, only subsistence farming took place in wetlands but with the introduction of the money economy, peasants have also been producing for market which implies that their activities on wetlands need to be regulated and in confirmation with the above section of the law. Peasant's production contributes a significant percentage towards Cameroon rice production and need to be regulated by the law. These smallholders help the country to meet its food production targets.

Rice is the staple diet of nearly 3 billion people that is half the world's population^{xxvi}. Rice is grown in wetlands across Asia, West Africa in general and Cameroon in particular. The Millennium Ecosystem Assessment^{xxvii} gave wetlands a value of US 15 trillion dollars in 1997 confirming to the socio-economic importance of wetland ecosystems^{xxviii} around the globe in general and Cameroon in particular.

Fishing

Another important socio-economic activity in wetlands is fishing^{xxix}. It is estimated that 51.000km² of freshwater and 10.000 family fishponds produce 83% of Tanzania's total fish catch by weight and 60% by value (40% of the total value was from Lake Victoria alone)^{xxx}. Tilapia was the major fish (35%) caught in Lake Victoria^{xxxi} but it is likely that this percentage has been reduced due to the introduction of Nile perch. This practice is contrary to the Environmental management Code of Cameroon which states that "natural resources shall be managed rationally to meet the needs of the present generations without compromising the capacity of future generations to meet their own needs"^{xxxii}.

Over decades, the Barombi Mbo Lake has been used for fishing and the shores as a market for the Barombi Mbo village^{xxxiii}. Fish from the lake seems to be the dominant source of protein for the villagers. Moreover, the fish is a delicacy to most within the metropolis. Consequently, artisan buyers, mainly women (buyam sellam) visit the shores each morning to buy fish for roasting back in the town of Kumba. Often, fish bought is prepared by the shores, the gills and entrails returned to the lake where they act as fish food.

The fish trade has been established for over 40 years and profits of up to 85% where sometimes registered^{xxxiv}. Long standing buyers have particular fisher men who supply them with fish.

One of the buyers said “she uses the money she has to pay for fish to play “njangi” for the fishermen in Kumba”^{xxxv}. Every Wednesday and Saturday, food stuffs^{xxxvi} are brought to this market to supplement the fish trade. On such days, the market attracts dozens of customers who are inhabitants of the kumba metropolis, with the potential to increase if there is higher fish catch and more supply of food.

In Lake Tanganyika, the fishing of daga^{xxxvii}, a fresh water sardine, has been carried out for both local consumption and export, mostly to Zambia^{xxxviii}. Demand for fish meal made from daga for use in the stock-feed industry, may affect the economics of the fishery by increasing the price of daga beyond the scope of the poor. People’s nutritional status is often threatened by commercialization of the fishing industry as fishermen often sell the whole catch, retaining none for home consumption or price rise so the poor can no longer afford to eat fish.

In the past, fishing by peasants was carried out using traditional technology. Most of the methods used were not harmful to non-target species but the recent use of dynamite, especially in the coastal areas, threatens the aquatic environment and thus a major part of the people’s diet. The Hadejia-Jama wetland in Nigeria for example provides a flood plain fishery harvest of 4000 to 5000 tons per year^{xxxix}.

The commercialization of prawn fishery for example has made the coastal areas of Cameroon to face degradation due to over exploitation of the wetland natural resource of this area, especially in Limbe, Douala and Ideneau respectively, places where foreign trawlers are found. Some of these trawlers fish indiscriminately, being interested only in the catch, and they may deplete the prawn fishery in particular and other fish species in general which is a natural resource and part of Cameroon’s wealth worth protecting taking into consideration its socio-economic benefits to the local communities within the wetland in particular and the State in general.

It is for this reason that the Environmental Management Code of Cameroon provides that “the protection of nature, the preservation of animal and plant species and their habitat, the maintenance of biological balances and ecosystems and the conservation of biodiversity and genetic diversity against all causes of degradation and threats of extinction are of national interest. It shall devolve on the Administration and each citizen to safeguard the natural

heritage’^{xl}. It is now left on the political will to put into effect the effective implementation and enforcement of this section of the law in order to protect the natural wealth of Cameroon from degradation and loss.

Tourism and Recreation

Many coastal and inland wetlands are popular locations for tourism and recreational activities, they provide important leisure facilities such as swimming, boating, fishing, camping, canoeing, shell collecting, bird watching, snorkelling, and hunting^{xli}. Wetlands are very rich reservoirs of endangered species of flora and fauna especially waterfowl. It is for this reason that they are described as “biological supermarket”^{xlii}. Many eco-tourists visit these areas for any of the above activities^{xliii} and as a result they bring with them hard currencies and create employment which goes a long way to improve on the living conditions of those who benefit from the employment, the local communities and the State.

In the case where the development of regular activities on wetlands is detrimental to the life of the species and the environment, that kind of development should be prohibited. The Environmental Management law of 1996 provides that:

The promoter or owner of any development, labour, equipment or project which may endanger the environment owing to its dimension, nature or the impact of its activities on the natural environment shall carry out an impact assessment, pursuant to the prescription of the specifications. This assessment shall determine the direct or indirect incidence of the said project on the ecological balance of the zone where the plant is located or any other region, the physical environment and quality of life of the populations and the impact on the environment in general. However, where the said project is undertaken on behalf of the national defense services, the Minister in charge of defense shall disseminate the impact assessment under conditions compatible with national defense secrets^{xliv}.

In *Morris J. Feinson v. Conservation Commission of the town of Newton*^{xlv}. This case arises out of the denial of an application to conduct a regular activity in an inland wetland. The plaintiff J. Feinson, appealed against the action of the defendant, Newton Conservation

Commission (NCC)^{xlvi} to the Supreme Court. The Court sustained the appeal and ordered the application to be approved because the activities to be carried out on the wetland confirm to the environmental policy of the State. Wetlands are very important ecosystems. Decisions to develop regular activities on them should be put in place for the benefit of all. On the same note, in *Karen A. Grimes v. Conservation Commission of the town of Litchfield*^{xlvii}, where the appeal concerned the denial of an application for a permit to conduct regulated activity in an upland review area. The plaintiff appeal against the judgment of the trial Court, dismissing their appeal, the Court of Appeal upheld the decision of the trial Court which is to the effect that the plaintiff did not respect environmental norms.

Wetlands are also used as recreational areas. This helps to improve on the social standard of those benefiting from these natural recreational centres. It provides them with leisure and helps to take away stress, for example Sinclar wetland near Dunedin, the Miranda shorebird centre at the firth of Thames^{xlviii}, Lake Ossa Complex, and Lake Awing, Lake Chad are all examples of wetlands providing social comfort to their immediate communities. In a situation where the development of wetlands is detrimental to the life of species and the environment, that kind of development should be prohibited because of the damages it may cause to the wetland. The Environmental Management Law of Cameroon provides that:

Urban development plans and public or private housing development plans shall take into consideration environmental protection while choosing locations for economic activity and residential and leisure zones. Prior to their implementation, these plans must record the obligatory opinion of the Administration in charge of the environment^{xlx}.

This implies that in constructing a structure for economic activities, for residential purposes or for leisure, the structure should take into consideration environmental conservation via the obligatory opinion of officials in the Ministry of Environment. The intention of the Cameroonian legislator is evident but it is difficult to achieve the intended results due to the lack of human resource capacity and a high degree of corruption by State officials who are either accomplices or associate themselves in environmental crimes for personal gains. The

resultant effects to the above behavior are total degradation of wetlands, see for example the illegal exploitation of mangroves in Douala.

In the case *Loveladies Harbor, Inc v. United States*ⁱ, the Court affirmed the Federal court's decisions that the U.S Army Corps of Engineer's denial of the residential development company's request for a Federal Water Pollution Control Act (FWPCA)^{li} permit to fill wetlands was a complete regulatory taking of the property for which the permit was sought. The court also upheld the trial court's award of 2.658.000 million dollars in just compensation.

The annual value of recreation on wetlands was estimated to be about 4.4 million dollars' bases on an estimate of 114.685 participants each year and per person daily value of about 38 million dollars. Most of the recreation value was associated with bird watching and outdoor recreation in signature sites in the Shepard slough, for example Ralph Klein Park^{lii}.

Science and Education

Wetlands provide important locations for scientific research and play an important role in educating people about biodiversity and natural processes in New South Wales [NSW]^{liii}. The Office of Environment and Heritage [OEH]^{liv} and educational institutions conduct research into the ecological response of river flows, flooding and environmental watering of wetlands, and the response of plants and animals such as colonial nesting water birds, to environmental watering^{lv}. The Environmental Management Code provides that:

Scientific exploration and biological and genetic resource exploitation in Cameroon shall be done under conditions of transparency and in close collaboration with national research institution and local communities and should be profitable to Cameroon. The exploration and exploitation should be done under the conditions stipulated by the international conventions relating thereto, duly ratified by Cameroon, especially the Rio Convention of 1992 on biodiversity^{lvi}.

The above section of the law recognize the important role biological and genetic resources play in the socio- economic life of the country and so demand for transparency in their transactions and in conformity with international norms signed and rectified by the Republic of Cameroon.

Wetlands are used by schools, universities and the public to learn about the ecological importance of wetlands and the other benefits and services they provide to the community. Wetland education centres are located in the lower Hunter near Newcastle, Bicentennial Park in Sydney, the Wonga wetland on the Murray River in Albury, and on Narrabeen Lakes in Sydney^{lvii}. The Environmental Management Law states that “environmental education should be introduced in primary and secondary school curriculums as well as in institutions of higher learning^{lviii}. The law further provides that:

In order to strengthen environmental awareness in the society and increase the sensitization on and participation of populations in environmental issues, the Administration in charge of the environment and communication, as well as other Administrative units and public bodies concerned shall launch information and sensitization campaigns using the media and other means of information^{lix}.

The legislators of the law believed that strengthening environmental awareness amongst the populations is the responsibility of the Administration in charge of the environment and communication and this should be done via information and sensitization campaigns using the media and other means of communication. To the law makers it is through these measures that the populations will become interested on environmental conservation and the benefits they contribute to the socio-economic growth of the country. For example, an estimate of 10.550 students was expected to visit the Ralph Klein Park in 2012 to participate in education programmes, most of the visitors originate from local and surrounding areas of the Park pushed by campaigns and sensitization by the government of the city of Calgary, Alberta^{lx}.

Job Security

Wetlands can be important tourism and recreation sites and support local employment^{lxi}. For example, in the Ibera Marshes in Argentina, conservation-base tourism activities have received the economy of colonia carlos Pellegrini, near the Ramsar site “Lagunas Y Esteros del Ibera”, creating new jobs and allowing local inhabitants stay employed in the town rather than migrate to cities to look for work^{lxii}. It is believed that around 90% of the population now works in the tourism sector^{lxiii}. In order to favour local employment, site managers should provide local rangers and guides with training on working with tourists, this should especially be encouraged

in Cameroon on tourists visiting Lake Oku, Lake Barombi Mbo, Lake Awing and others around the national territory because this will help to create jobs and improve on the living standard of the locals.

Medical and Aesthetic Importance of Wetlands

Medically speaking, some wetland trees, grass, leaves and flowers are used as traditional medicines by the local communities close to wetlands, for example, the lake Barombi mbo has a tree called Ngalgatola whose bark is used for the treatment of malarial^{lxiv}. The indigenes have been using the bark of this tree for centuries for the traditional treatment of malarial^{lxv}. The Environmental Management Law of Cameroon provides that:

Cameroon's biodiversity is used sustainably, especially through:

- ❖ An inventory of existing species, particularly of those that are endangered;
- ❖ Management plans of species and the preservation of their habitat;
- ❖ A system on the control of access to genetic resources^{lxvi}.

To the law markers a record of all the species, their management plans, preservation of their habitats for example wetlands, and a system of control of access to the genetic resources should be put into place in order to guard against illegal exploitation of these natural resources for the private gains of particular individuals. To them the biodiversity resources should be used sustainably for the benefits of all. That is for the benefit of both the present and the future generation. To achieve these wetland ecosystems must be protected of the illegal activities of man.

In Tanzania for example the value of medicinal trees associated with wetlands is being studied in collaboration between researchers and traditional doctors, "waganga", at Muhimbili College of Health Sciences, a Traditional Medicine Center^{lxvii}. At the University of Dar es Salaam, the Department of Botany is carrying out research on marine algae, which show promise as an export crop for use in local industry^{lxviii} all these initiatives are for the benefit of the entire society.

Wetlands provide an important reservoir of genetic materials, the genetic resources derived from wetlands may be used in pharmaceutical industries^{lxix}. Biological processes occurring in

wild species found in wetlands may be very important for human medicine. For example, certain small fish^{lxx} from the desert of North America are adapted to particular extreme conditions of temperature and salinity as they live in water twice as salty as the sea^{lxxi}. These fish provide biological models for medical research on how the kidney work and on adaptation to very high temperature. However, the endemic species are restricted to small water-bodies in the desert areas and are mostly endangered and need to be protected because of the role they may play in the social and economic life of humans. The Environmental Management Law of 1996 states that:

The protection of land against erosion and the prevention and fight against desertification are publicly useful. These actions are taken particularly through the planification of the land use and zoning, re-afforestation as well as the dissemination of ecologically efficient methods of land use^{lxxii}.

Aesthetically, wetlands are green throughout the year and attract various birds and animals. They have their own unique and balanced environments. Such areas are attractive to both local and foreign visitors and have become tourist centers. These environments are developed and conserved; they become a source of income and recreation and are a pride to the nation. For example, wetlands have a value of 15 trillion dollars^{lxxiii} which if properly conserve and exploited will be of great socio-economic benefit to the state.

Aesthetic services refer to opportunities and experiences relating to beauty of nature and its appreciation of enjoyment^{lxxiv}. The benefits that people derive from wetlands include opportunities for photography and artwork undertaken on the landscape, as well as a general appreciation of the landscape, surface waters and wildlife. Many people gain these benefits along with education and recreational activities including hiking, hunting and wildlife viewing. It is for the above reasons that the Environmental Management Code of Cameroon stipulates that:

An enabling decree of this law shall determine the historic, archaeological and scientific sites, as well as the sites that are of special panoramic beauty, and shall ensure their protection and lay down the conditions under which they shall be managed^{lxxv}.

One aspect of an aesthetic service, the amenity value of wetlands associated with housing prices is very vital to discuss here. Urban development is increasingly incorporating wetland features into their landscape planning for two main reasons namely, amenity and aesthetics, and storm water management^{lxxvi}. The importance of leaving natural areas in communities has been quantified as very important. For example, it is found that residents in Bridle wood Creek^{lxxvii} were willing to pay more to live close to the local community wetland^{lxxviii}.

In Mckenzie Town, there is a clear relationship between property value and distance/ adjacency to wetlands. If the property is adjacent to a wetland, the value of the house increases by 5.136 dollars over the mean house value in the development^{lxxix}. Decreasing distance to the nearest wetland is directly related to increasing house values. For every additional 10 meters closer to a wetland, house values increase by 271 dollars^{lxxx}. For the locality of Copperfield to note, if the property is adjacent to a wetland, the value of the house increases by 4.390 dollars over the mean house value in the development^{lxxxi}.

The examples above are intended to bring out the aesthetic benefits of wetland ecosystems which the Government of the Republic of Cameroon must take into consideration and in cooperate in her national law for the proper management of wetlands.

Flood Control

The most significant socio- economic benefit that wetlands provide is flood control^{lxxxii}. Peat lands and wet grasslands alongside river basins can act like sponges, absorbing rainfall and controlling its flow into streams and rivers. When peat becomes completely saturated and unable to absorb any more water, surface pools and peat land vegetation, including sedge meadows and some types of forest, help to slow and reduce runoff. Similarly, floodplains alongside major rivers, such as the Nile, Yangtze and Danube allow heavy rainfall or springs snowmelt to spread out slowly. When the peat bogs are drained, or the floodplains reduced, the risk of flash floods is increase^{lxxxiii}. The Environmental Management Law of 1996 states that: Flood plains shall be specially protected. This protection shall take into consideration their role and importance in biodiversity conservation^{lxxxiv}.

It is unfortunate that the legislators did not identify the manner or ways of which this very important wetland type should be protect, but they however, explain why they should be specially protected, because of their role and significance in biodiversity conservation.

From Alberta Government final report on October 2011, the cost of replacing natural wetlands with constructed wetlands that provide the same amount of flood control services was estimated to be about 338 Million dollars for the whole study arealxxxv. This corresponds to an estimated 2 million dollars per year in economic values losseslxxxvi. River systems with intact wetlands in their head waters have more consistent flows than rivers where the catchment and its wetlands have been largely clearedlxxxvii.

Almost any wetland can provide some measure of flood protection by holding the excess runoff after a storm, and then releasing it slowly. The size, shape, location, and soil type of a wetland determine its capacity to reduce local and downstream flooding. Wetlands lower flood peaks by temporarily holding water and by slowing the water velocity. Wetland soil acts as a sponge, holding much more water than other soil typeslxxxviii. Even isolated wetlands can reduce local flooding. If the wetlands were not there to hold storm water runoff, backyards and basements might end up under waterlxxxix.

If a wetland is drained, the risk of floods in unwanted places may increase, unless counter-measures such as the construction of dikes are taken into consideration, which in most cases are very costly to the states as compare to the natural wetland ecosystem.

However, climate change is posing new future risks, through increases in sea-level and extreme river discharges. In the Dutch situation dikes are still the economically cheapest solution, but the prospect of indefinitely raising dikes is very unattractive. Thus, the less heavily developed former wetlands may get a new lease of life. Restoration-broadening floodplains, (re)creating water retention areas in natural depressions, (re) opening secondary channels of rivers are now on the political agendaxc.

In the Charles River, Massachusetts, conservation of 3.800 hectares of wetlands along the main stream provides natural valley storage of flood water. It is estimated that if these wetlands had

been destroyed by reclamation, the increased flood damage would have cost 17 million US dollars each year^{xcvi}.

Water Transport

Many communities close to wetlands use the water ways as means of transportation^{xcvii}. On Lake Titicaca, communities live on floating islands of reed mats and communication among communities is entirely by boat^{xcviii}. Along the pacific coast of Nicaragua, channels within the mangroves provide the only means of communication between settlements^{xcix}. Canals are an example of the creation of artificial wetlands specifically for transport^{xcv}.

The Barombi Mbo Lake in the South West Region of Cameroon is also use as a means of transport^{xcvi}, where the lake is considered as a mixed blessing because illegally-logged timber is moved across in dugout boats while the same means of transportation is the shortest way to Barombi Mbo village. There is therefore a potential to develop thriving socio-economic activities closely link to the lake, but this can only be possible if the lake and its resources in the adjoining reserve are protected and sustainably managed for the present and future generation^{xcvii}.

Timber, Fuel-wood and Tree Products

Wetlands provide vital supplies of timber for construction, fuel wood for cooking and heating; and other tree products used for medicines^{xcviii}. Along the pacific coast of Nicaragua for example, mangroves yield timber for construction, and fuel wood^{xcix}.

The melaleuca wetland forests of Vietnam and Thailand also provide a wide range of products, including locally used medicines. In Matang Forest Reserve, Malaysia, for example, 40.000 hectares of mangroves annually yield timber worth 9 million US dollars^{ci}. While in the Wouri estuary, the mangroves are harvested for several reasons by the populations and what makes it bad is that the quantity of mangroves harvested is not known, and so therefore very detrimental to the wetland. To regulate this illegal activity, the Republic of Cameroon in its Environmental Management Law stipulates that:

Mangrove ecosystems shall be specially protected, taking into account their role and importance in marine biodiversity conservation and the maintenance of coastal ecological balances^{cii}.

The above sections of the law, however, fail to specify how this ecosystem will be protected, and this had encouraged their continued exploitation with impunity.

Water Distillation

Wetlands act as the Earth's filters, cleaning up water in a number of ways^{ciii}. For example, nitrogen in water is transformed to harmless nitrogen gas, nutrients are taken up by wetland plants in the water. Wetlands remove pollutants such as phosphorous, heavy metals and toxins which are trapped in the sediments of the wetlands. In the United States of America, New York City found that it could avoid spending 3-8 billion US dollars on new waste water treatment plants by investing 1.5 billion US dollars in the purchase of land around the reservoirs upstate^{civ}. This land purifies the water supply for free, and therefore, save the City from spending exorbitant amount of dollars for the construction or purchase of waste water purification plants.

In Cameroon South West Region, Kumba, Lake Barombi Mbo is responsible for the supply of clean drinking water to the urban areas. Cameroon Water (CAMWATER) and Les Camerounaises Des Eaux (CDE) are responsible for the supply and management of water from the lake to the town of Kumba and its environs, more than 300.000 people depend on the lake for clean potable water^{cv}.

The United States Forest Service Study estimated the value of clean water that is filtered by forest watersheds to be worth 0.05\$ per cubic meter for municipal water use^{cvi}. Such values can be transferred to estimate the dollar value for flood control services and water filtration services provided by wetlands. In the larger boreal study, the average wetland values for flood control services were estimated at 46.5 million dollars per year, and water- filtering services were an estimated 28.9 million dollars per year (2000 dollars)^{cvi}. Wetlands contribute greatly to water quality improvement at a lower cost^{cvi}.

Wetlands can also provide waste water treatment and protection against coastal and river flooding^{cxix}. For example, The Catskill/ Delaware watershed provides about 90 per cent of the water used by New York City citizens^{cx}.

In 1997, a study shows that building a new water treatment plant would cost between 6 and 8 billion US dollars, whereas ensuring good water quality through measures to reduce pollution in the watershed would only cost 1.5 billion US dollars^{cxii}. This study led to programmes that promote the sustainability of the watersheds^{cxiii}. The ability of wetlands to recycle nutrients makes them critical in the overall functioning of the earth. No other ecosystem is as productive, or as unique in this conversion process. In some places artificial wetlands were developed solely for the purpose of water purification^{cxiii}.

The Contribution to Biodiversity Conservation

Wetlands are some of the most important biologically diverse areas in the world and provide essential habitats for many species, not only waterfowl^{cxiv} and fish but also reptiles^{cxv}, amphibians, invertebrates, mammals and plants of various types which attract a lot of lucrative activities on them. Wetland-dependent species are often rare, threatened and found only in very restricted geographical areas^{cxvi}. Fresh water lakes and rivers contain just 0.008% of world's available water but are of great importance for biological diversity as they contain 12% of animal species and 41% of all known fish^{cxvii}. Lakes known for example to house exceptional biodiversity include Lake Baikal in Asia and the African Lakes^{cxviii}. Arid wetlands may also be biodiversity "hotspots" for example, the prairie potholes of North America for water birds and the Okavango Delta^{cxix} which attracts millions of tourists yearly. The Environmental Management Law of Cameroon provides that:

The protection of nature, the preservation of animal and plant species and their habitat, the maintenance of biological balances and ecosystems and the conservation of biodiversity and genetic diversity against all causes of degradation and threats of extinction are of national interest. It shall devolve on the Administration and each citizen to safeguard the natural heritage^{cxx}.

The above section of the law is a clear indication that the Republic of Cameroon is interested in protecting biodiversity from degradation and loss especially from anthropogenic activities.

Wetland-dependent mammals such as hippopotamus, manatees and river dolphins are among those examples of biodiversity covered by the global Ramsar Convention network^{cxxi} which comprises over 2,000 sites covering over 1.9 million km^{cxxii}. The major wetlands in the Ramsar network include: the Danube Delta in Romania and the Ukraine, the Pantanal wetlands across Brazil, Bolivia and Paraguay and Lake Chad across Chad, Niger, Nigeria and Cameroon^{cxxiii}. The above wetland dependent species of biological diversity and many other species attract millions of tourists who come along with hard currencies, provide jobs, thereby improving on the socio-economic situation of communities close to these wetlands as well as the state.

THE CULTURAL IMPORTANCE OF WETLANDS

Cultural values are a set of values shared and defined by a group or community^{cxxiv}. These values themselves derive their meaning from this particular group or community^{cxxv}. Throughout history humans have gathered around wetlands and these areas have played an important part in human development and are of significant religious, historical or archaeological value to many cultures around the world, for example, on the Cobury peninsula^{cxxvi}, traditional Aboriginal owners still conduct an active ceremonial life and undertake semi-traditional hunting and gathering in this coastal wetland^{cxxvii}.

Cultural services are described as the “nonmaterial benefits from ecosystems”^{cxxviii} where services and related benefits are, for the most part contingent on various human activities or experiences occurring in a particular setting. Wetlands are sacred places, they give us a sense of peace and wellbeing, it is important to maintain wetlands for present and future generations because of the traditional values they play in the life of those communities close to them, for example, the Awing people, Oku, Barombi Mbo and the Marsh Arabs of Southern Iraq and their cultural attachment to wetlands^{cxxix}. Under the cultural importance of wetlands, we shall examine heritage and spirituality.

Heritage

Heritage services are the opportunities related to traditional, historical, spiritual and religious understanding and uses of a place^{xxx}. These services refer to the “place-based” benefits derived from beliefs, activities and experiences such as; “sense of place”, “sense of belonging”, and “sense of self/ identity”. For example, a heritage environmental service (ES) could be learning about cultural traditions, such as sweet grass harvesting, activities including hunting and fishing has direct correlations to heritage services, practice by the people of Awing in Lake Awing of North West Region of Bamenda, Cameroon^{xxxi}. It is for this reason that the legislator in the Environmental Management Code of Cameroon provides that:

The protection, conservation and enhancement of the cultural and architectural heritage are of national interest^{xxxii}

The above section of the law brings out the intention of the Cameroonian legislator to protect all human settlements in Cameroon and as we know wetlands are a cultural settlement to most communities in the country, so therefore, implicitly, the law is protecting wetland ecosystems from degradation and lost from human activities.

As a legacy, In spite of the presence of neighbours and the settlement of non-native in the new quarter, majority of whom are from the North West Region of Cameroon, the Barombi Mbo people only, have the sole cultural rights over the resources of the lake, the right to fish in the lake is controlled by and attributed only to Barombi Mbo people, they have to practice fishing according to the traditional and cultural guidelines, by so doing they attached great cultural significance to the lake and there is need for the lake to be protected so that the cultural values of the natives of Barombi Mbo people will automatically be preserved for the present and future generations.

Spirituality

Spirituality is an important value for many communities close to wetlands^{xxxiii}. The Awing people of the North West Region of Cameroon for example, have great spiritual connectedness with Lake Awing. To them the lake has spiritual powers of fertility to women looking for the

fruit of the womb, most women testified that after many years of barrenness in their marital homes, it was only when traditional sacrifices were offered to the gods of the lake that they become pregnant and had issues^{xxxiv}. They also believe that the lake moves from its initial location to where it is because the initial owners of the lake refuse to offer sacrifices to the lake. In addition, visitors are not allowed to visit the lake on particular days because to the people of Awing, the lake travels on those days. The people of Oku equally believe that, Lake Oku cannot be visited on particular days because the gods of the lake have their market on those days^{xxxv}.

The Ndiya people of the South West Region of Cameroon also believe that Lake Manengouba which is an extinct volcano and famous for its twin lakes is very important with regard to their tradition^{xxxvi}. The indigenes believe that the large part of the lake is “man lake” while the smaller one is “woman lake”, as a result of this description by names given to them, they are attributed spiritual powers by the indigenes on the grounds of the influence or authority of man and woman^{xxxvii}. The people believe that the “woman lake” is spiritually dangerous than the “man lake”, this is so because to them women are stronger in the spiritual world than men.

The people of Manengouba carry out their traditional ceremonies on the lakes in strict respect to the names and powers attributed to them. It is therefore very important to note that natives of this area hold the lakes in high esteem with respect to their mystical practices and so therefore the necessity to protect the lakes from degradation and loss if we are interested in protecting the culture of a people which is their way of life.

OTHER BENEFITS OF WETLAND ECOSYSTEMS

Apart from the socio-economic and cultural significance of wetlands discussed above, there are other values of wetland ecosystems, which are examined below

Shoreline and Storm Protection

The devastating effects of natural phenomena such as hurricanes, cyclones and tsunamis cannot be denied. Worldwide, an estimated 200 million people who live in low-lying coastal regions are at potential risk from catastrophic flooding^{xxxviii}.

Coastal wetlands such as reefs, mangroves and saltmarshes act as frontline defences against potential devastation^{cxix}. The roots of wetland plants bind the shoreline together, resisting erosion by wind and storm surges and tidal waves, thereby reducing their height and destructive power^{cxl}. In the Ganges-Brahmaputra Delta of India and Bangladesh^{cxli}, for example, the extent of cyclone damage behind the Sundarbans mangrove swamps^{cxlii} has historically been less than that behind non-mangrove coast. This explains why the Cameroonian legislator was so wise to have made a provision for the protection of mangrove ecosystems in the Environmental Management Law, which stipulate that:

Mangrove ecosystems shall be specially protected, taking into account their role and importance in marine biodiversity conservation and the maintenance of coastal ecological balances^{cxliii}.

They play therefore an economically important role in natural hazard management at a much lower cost than engineered structures and so they need to be specially protected from degradation caused especially by humans.

Carbon Repossession

Wetlands cover about 9% of the earth's surface and are estimated to contain around 35% of global terrestrial carbon^{cxliv}. Wetlands act as sinks for carbon dioxide and other greenhouse gases, especially if their vegetation is protected and their natural processes are maintained^{cxlv}.

Coastal wetlands, such as saltmarsh and mangroves, are likely to have the highest rates of greenhouse gas sequestration, and the drainage of melaleuca and mangrove forest wetlands in Australia would turn them from carbon sinks into carbon sources. Saltmarsh can bury an average of 1.51 tons of organic carbon per hectare per year and mangroves an average of 1.39 tonnes^{cxlvi}. These rates are several times higher than the rate of carbon burial calculated for the Amazonian forests, an important global carbon sink in the World.

This highlights the importance of protecting intact wetlands in helping to limit the impacts of climate change^{cxlvii}. Peat lands to add are now thought to perform important carbon sequestration functions. These "carbon sinks" absorb carbon dioxide from the atmosphere and incorporate the carbon into the stored organic material. Although peat lands contribute directly

to global programmes to reduce global warming, their value to greenhouse gas regulation has often been neglected.

Vital habitat for Species

It has been estimated that freshwater wetlands hold more than 40% of the entire world's species and 12% of all animal species^{cxlviii}. Individual wetlands can be extremely important in supporting high numbers of endemic species^{cxlix}. Wetlands provide a nursery habitat for many commercially important fish species that are harvested outside the wetland^{cl}. For example, the Hadejia-Jama wetlands in Nigeria provide a flood plain fishery of 4000 to 5000 tons per year^{cli}.

Wetlands are home to many special plants, birds and frogs, they provide essential habitat for rare or important species such as the endangered Southerbell frog and the murray cod, the hippopotamus, crocodiles and many other endangered species found in category "A" protected species in Cameroon's Forestry and Wildlife Law^{clii}.

A sanctuary for migrating birds

When winter sets in across the northern hemisphere, it triggers the most extraordinary mass movement of any living creature on earth, especially birds, the annual migration of countless birds over vast distances is alarming during this period. The world's wetlands offer a welcome pit stop, offering protection and food before the birds continue onto their final destination^{cliii}. In addition, wetlands at the edge of the Sahara Desert acts as resting places for birds that are preparing to cross the desert^{cliv}.

Climate change

Wetlands provide climate regulation, climate mitigation and adaptation, and carbon storage, through peat lands, mangroves, and tidal marshes. Peat lands cover 3per cent of the world's land surface, about 400 million hectares^{clv}, of which 50 million hectares are being drained and degraded, producing the equivalent of 6 per cent of all global carbon dioxide emissions^{clvi}. While vegetative wetlands occupy only 2 per cent of seabed area, they represent 50 per cent of carbon transfer from oceans to sediments, often referred to as "Coastal Blue Carbon"^{clvii}.

During the United Nations (UN) Conference on Climate Change in Le Bourget Northern Paris, December 2015, President Paul Biya addressed the conference immediately after the Nigerian Head of State and just before his Chadian counterpart took the floor. Significantly, all the three leaders share stakes in Lake Chad which is a living example of the devastation being caused by climate change, considering that in the past 50 years, the lake's total area has been reduced from its initial 25.000 km² to less than 2.500km² due largely to its waters drying up. This originates from global warming which means gas emissions are largely above 2°C which the UN Climate Conference sees as the very maximum if global warming has to stop **lviii**.

President Biya was one of those who sounded the note of warning about the absolute necessity to reach a binding agreement during this conference (COP21) even if, as he said Cameroon is a low greenhouse gas emitting country. "We cannot afford to fail", he talked of Cameroon's determination to reduce the carbon footprint by 32 per cent by 2035 while also controlling desertification and scaling up cooperation with other central African Forest Commission and the Lake Chad Basin Commission with regard to water resource management **clix**. To this effect the Republic of Cameroon in fighting against climate change that may be caused by classified establishments provides that:

Factories, workshops, warehouses, building sites, and on the whole, industrial, cottage industrial or commercial plants exploited or owned by any private individual or corporate body, private or public institution, and which pose or may pose dangers for public health, security, hygiene, agriculture, nature and the environment in general, or disadvantages for the conveniences for the neighbourhood shall be subject to the provisions of the laws and regulations in force on classified establishments **clx**.

It is important to mention here that the conservation of wetland ecosystems is a great solution to climate regulation, climate mitigation, climate adaptation, and carbon storage. Wetlands can easily fight against climate change, though seriously neglected in the performance of this function and in the greater part of it, they are abandoned to themselves to face degradation and threats of extinction from anthropogenic activities.

CHALLENGES TO THE SOCIO-ECONOMIC AND CULTURAL IMPORTANCE OF WETLANDS UNDER CAMEROON'S ENVIRONMENTAL MANAGEMENT CODE

The Environmental Management Law in Cameroon is facing challenges as far as the protections of wetland ecosystems because of their socio-economic and cultural importance are concern in the country. The huddles include inaccurate legal protection, human resources problems among others.

Inadequate Legal Protection

The socio-economic and cultural importance of wetlands ecosystems in Cameroon by the Environmental Management Code is hampered with inadequate legal protection. The Environmental Management Code failed to spell out succinctly that wetlands should be protected because of their socio-economic and cultural importance. Moreover, by the law, only two particular types of wetlands (mangroves and flood plains) should be specially protected because of their importance in biodiversity conservation^{clxi}.

The law should have been interested in protecting all wetlands within the national territory and should have been explicit on the manner of which this very vital but fragile ecosystem should be protected instead of being vague and never in any section of the law mention the word wetlands. In fact, section 94 of the law which talks of the protection of mangroves is found in the miscellaneous and final provisions of the law, this to the authors is evident of the fact that the legislator accorded very little importance to the protection of wetland ecosystems even though they play a significant role in the socio-economic and cultural life of the populations in general and the State in particular.

Human Resource Capacity Lapses

Human resource capacity is a huge problem in protecting wetlands in Cameroon Environmental Management law. The law has accorded special status to the staff of the Ministry of Environment, Mines and other services to identify, investigate and prosecute environmental offences^{clxii}. Although these officials have a crucial role to play in the protection of the

environment in general and wetlands in particular, they are not only few but also many of them are not specialists in wetlands management. What is more regrettable is that some of them facilitate the commission of wetlands related offences or associate with the offenders for their personal gains. However, the law had struggled to take measures that may prevent officials from committing or assisting in environmental crimes when it stipulates that:

The sanctions shall be doubled when the above-mentioned offences are committed by an official of Administration in charge of environmental management, or with their complicity^{clxiii}.

Although the law did not mention succinctly wetlands, implicitly wetlands are part of environmental management and any official committing or abating the commission of a crime on wetlands will be sanctioned by the law. However, we believe that the legislator should have in all honesty used the word wetlands in the law in order to avoid ambiguity of the law when a problem arises.

CONCLUSION AND RECOMMENDATIONS

From the forgoing, it is clear that wetlands are among the world's most productive ecosystems famously described as "Biological Supermarkets" because of the extensive food webs and rich biodiversity they support and as "Kidneys of the Landscape" because of the functions they perform in the hydrological and chemical cycles^{clxiv}. Wetlands have existed for a long time and have been utilized by the local people for their sustenance^{clxv}. Wetlands are a reservoir of natural resources to the Cameroonian people and so they should be used for the benefit of the nation. It is true that there are environmental problems related to the current development of wetlands and we should guard against the destruction of these important ecosystems, more efforts are needed to cooperate in educating decision makers that the destruction of wetlands is the destruction of the socio-economic and cultural lives of the people close to wetlands and the state as a whole. Many species of fauna and flora are found in wetlands and if wetlands are disturbed, it will also affect man socially, economically, ecologically, and culturally^{clxvi}.

However, to avoid these effects in Cameroon, we recommend that to surmount the hurdles to the effective conservation of wetlands, the Cameroonian legislator should be able to enact a separate law that will correct the inadequate legal protection of this fragile but very vital ecosystem to man and the environment. Cameroon to note has no definition of wetlands in her Water Code of 1998^{clxvii} and Environmental Management Code of 1996^{clxviii}. Therefore, Cameroon from all indications has just endorsed the definition of the Ramsar Convention which is not void of shortcomings when she ratified it in 2006. We think that for wetlands to be effectively protected, the Republic of Cameroon should be able to bring out her own national accepted definition of wetlands. In doing so, a national clear cut wetland policy reflecting the definition and the mechanism for which wetland conservation can be taken seriously would easily be put in place in the national territory, and by so doing implementation and enforcement of adequate wetlands legislation would be facilitated^{clxix}.

Taking into consideration the number of wetlands in Cameroon and the manner in which they are managed, it is clear indication that the number of workers to carry out this job are limited, we therefore, recommend that the government of Cameroon should employ and train more experts on wetland's management and also work in collaboration with national and international Non-Governmental Organizations (NGO) involved in the conservation of wetland ecosystems for effective and sustainable management of this very important ecosystem. The officials should be train on best practices and should always be reminded that if they are found guilty as accomplices or abating a crime on wetlands, they will be doubled sanction by the law^{clxx}.

Wetlands in Cameroon in particular and the world in general are regarded as waste land, as a result of this they are used with impunity both by the public and private sectors. We therefore recommend that the government through the Ministry of Environment, Nature Protection and Sustainable Development, NGOs and the Civil Society should promote the sensitization of the populations on the socio-economic and cultural importance of wetlands because we believe that wetlands legislation alone cannot be effective and sustainable for the proper protection of wetland ecosystems from anthropogenic factors that usually and easily lead to their extinction.

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