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ENVIRONMENTAL EDUCATION AND SUSTAINABLE DEVELOPMENT: CASE OF SOME SELECTED SECONDARY SCHOOLS IN YAOUNDÉ VI

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Award of a Master's Degree in Educational Management on the 20th July 2023

Speciality: Educational Planning

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DEDICATION

This work is dedicated to:

The EBOT AKOACHERE and EGBE TAKU Families

SUMMARY

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LIST OF ABBREVIATIONS

COSBIE:	Complex Scolaire Bilingue Emmaus Mendong
DESD:	Decade for Education for Sustainable Development
EE:	Environmental Education
EESD	Environmental Education for Sustainable Development
ESE:	Environmental sustainability education
ERuDeF:	Environment and Rural Development Foundation
FAO	Food and Agricultural Organization
GBHSE:	Government Bilingual High School Etoug-ebe
GBHSM:	Government high School Mendong
IEEP:	International Environmental Education Program
IISD:	International institutions for sustainable development
IPET:	International Placement of Education Types
IUCN :	International Union for the Conservation of Nature
MDGs :	Millennium Development Goals
MEA:	Minnesota Education Academy
MINEPDED:	Ministry of the Environment, Protection of Nature and Sustainable Development
MINFOF :	Ministry of Forestry and Wildlife
NAAEE	North American Association for Environmental Education
NGO	Non Governmental Organization
OECD:	Organization for Economic Co-operation and Development
SD:	Sustainable development
SDGs:	Sustainable Development Goals
TPB:	The theory of planned behavior
TBL:	Triple bottom line theory of sustainability
UN:	United Nations
UNESCO :	United Nations Educational, Scientific and Cultural Organization
UNEP:	United Nations Environment Program

QIS: Quality international School

WCED: World Commission on Environment and Development

WHO: World Health Organization

WWF: World Wildlife Fund

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ABSTRACT

This study was motivated by an empirical discovery that despite the fact that environmental challenges have enormously dominated global, regional and local agendas over the past four decades, environmental education is not given sufficient attention in all institutions especially the secondary schools and to this effect, the sustainable protection of life on life is not strongly achieved. As a result, the main objective of this study was to assess the impact of environmental education on sustainable development in protecting life on land in some selected secondary schools in the Yaoundé VI. Empirical data were collected through questionnaires from a sample size of 200 students while the Pearson correlation test and linear regression analysis were used as statistical tools. Results reveal that education on waste management($r=0.223$; $p=0.005$) and education on gardening ($r=0.171$; $p=0.016$) show a positive correlation with sustainable development in protecting life on land while education on green partnership ($r=0.139$; $p=0.049$) reveals a weak and positive correlation in protecting life on land. On the other hand, education on green pedagogic actions ($r=0.071$, ns) show no significant relation with sustainable development in protecting life on land. These results show that Environmental Education plays a major role towards ensuring sustainable development in protecting life on land thus environmental education should be implemented in schools to improve the quality of education for sustainable development.

Keys words: environmental education, sustainable development, Life on land and secondary schools.

RESUME

Cette étude a été motivée par une découverte empirique selon laquelle, malgré le fait que les défis environnementaux ont énormément dominé les agendas mondiaux, régionaux et locaux au cours des quatre dernières décennies, l'éducation environnementale ne reçoit pas une attention suffisante dans toutes les institutions, en particulier les écoles secondaires et, à cet effet, la protection durable de la vie sur la vie n'est pas fortement atteinte. En conséquence, l'objectif général de cette étude était d'étudier l'impact de l'éducation environnementale sur le développement durable dans la protection de la vie sur terre dans quelques écoles secondaires sélectionnées dans l'arrondissement de Yaoundé VI. Les données empiriques ont été recueillies au moyen de questionnaires auprès d'un échantillon de 200 élèves tandis que le test de corrélation de Pearson et l'analyse de régression linéaire ont été utilisés comme outils statistiques. Les résultats révèlent que l'éducation sur la gestion des déchets ($r=0.223$; $p=0.005$) et l'éducation sur le jardinage ($r = 0,171$; $p = 0,016$) montre une corrélation positive avec la protection de la vie sur terre avec la valeur tandis que l'éducation sur le partenariat vert ($r = 0,139$; $p =0,049$) révèle une corrélation faible et positive alors que l'éducation aux actions pédagogiques vertes ($r=0,071$, ns) ne montre aucune relation significative avec le développement durable dans la protection de la vie sur terre. Ces résultats montrent que l'éducation à l'environnement joue un rôle majeur pour assurer le développement durable en protégeant la vie sur terre. L'éducation à l'environnement devrait donc être mise en œuvre dans les écoles pour améliorer la qualité de l'éducation au développement durable.

Mots clés: l'éducation à l'environnement, le développement durable, la vie sur terre et les écoles secondaires.

GENERAL INTRODUCTION

As Pujol (2000) puts it, consumption becomes an environmental problem that has social importance from the moment at which the individual and society have to consume in order to live. Sauvé 1992 sees the environment as nature to be appreciated, respected, preserved; as a resource to be managed; as a problem to be solved; as a "place to live" to know and learn about, to plan for, to take care of; as the biosphere in which we all live together, into the future; and the environment as a community project in which to get involved; making the environment a very important component of living thus needs to be conserved.

The relationship between society and nature are always a reflection of the economic organization and established policies of society and, consequently, environmental problems can only be explained with reference to those organizations. In this context Leff (2000) argues that the maximization of short term economic benefits has generated the globalization of a set of effects: pollution of air, land, water, rivers, lakes and seas, environmental degradation by means of deforestation, soil erosion, loss of fertility, and waste of finite resources.

Education for sustainability is the answer. It is transformative. Providing the right information and education can change people's values and behaviors, encouraging them to adopt more sustainable lifestyles. It can also break the cycle of poverty, malnutrition and disease that affects so many worldwide. The power of education within the context of sustainable development was given center stage when the United Nations General Assembly declared the United Nations Decade on Education for Sustainable Development from 2005 to 2014. The Decade helped focus attention on the fact that education is an indispensable element for achieving sustainable development.

All the above permitted us to come up the research topic: The impact of Environmental Education and Sustainability Development; case of some selected secondary school in Yaoundé VI. This work articulates around the general objectives: assessing the impact of environmental education on sustainable development in protecting life on land in some selected secondary schools in Yaoundé VI sub-division in the center Region of Cameroon. This work will principally be presented in 6 main chapters; Chapter one also referred to as the problematic is the fundamental chapter of the study as it presents the principal elements that make up the foundation of this study; Chapter two

focuses on the review of existing works on the variables of the study carried out by different authors and researchers.

It equally reviews some relevant information on the concepts; Chapter 3 reveals in some depth the theories and model behind environmental education for sustainability; Chapter 4 is principally based on the research methodology where we shall present the study population and the instruments used in collecting and analyzing data; Chapter 5 focuses on data analysis and presentation of results, and the analysis of the primary factors on one hand and the analysis of the secondary factors while Chapter 6 presents data and analyses the results of our findings from the statistical treatment (Correlation and regression).

CHAPTER 1: INTRODUCTION

This chapter is the fundamental chapter of the study as it presents the principal elements that make up the foundation of this study. This chapter comprises of a brief overview of the contextual background, which reveals evidence of the situation of the environment relative to sustainable development as a whole and in Cameroon in particular. This will be followed by the problem statement, the theoretical background will complement this contextual background, research questions and objectives, significance of study, delimitation of study and type of study which are the thrust for this write up.

1.1. Empirical Context

Environmental challenges have enormously dominated global, regional and local agendas over the past four decades. Evidence from numerous studies has shown that biodiversity is declining rapidly, due to human activities such as over exploitation, harvesting, habitat destruction and modification, pollution and the introduction of exotic species (Trombulak et al., 2004). In the same light, Muoki et al. (2020) state that Globally, the environment is under pressure from climatic variability and anthropogenic activities including deforestation, wetland and water catchment destruction, agro-chemicals use and urbanization, among others. As a consequence, the loss of biodiversity and deteriorating ecosystems have contributed to worsening human health, increasing food insecurity and the vulnerability of ecosystems to natural disasters, lessening material wealth and worsening social relations by damaging ecosystems that are highly valued for their aesthetic, recreational or spiritual values (MEA, 2005). Moreover, studies have associated environmental changes with a host of negative impacts, including altered distributions of some infectious disease vectors (ticks at higher latitudes, malaria mosquitoes at higher altitudes) and a trend towards extreme weather events and associated casualties, injuries and other health risks (McMichael & Lindgren, 2011). Worldwide, environmentally related problems have become a multisectoral issue, with reports on the projected radical impacts of climate change on human existence beginning to shape educational research in areas such as curricula and learning (Kagawa et al., 2009). With this in mind, both educational policymakers and curriculum developers play an active role in shaping the environmental agenda

(Kudo et al., 2019). This section will does present some statistics on environmental challenges on sustainability.

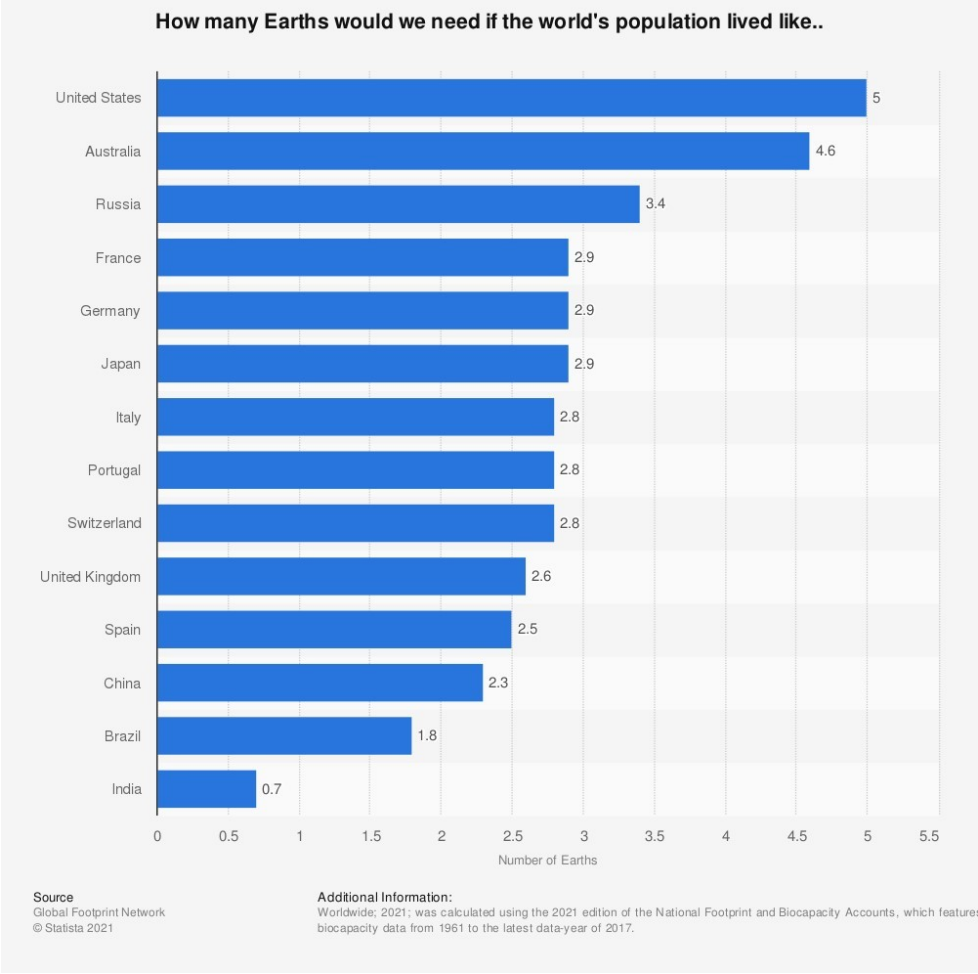
1.1.1. Statistics on environmental hazards on sustainable development

- **Statistics from International level**

Environment hazards is a call for concern for both international organizations and governmental bodies. In effect, our planet Earth is in danger if these hazards are not attended to. How many Earths would we need if the world's population (fig 1.1) lived like Global footprint network (statista 2021). We a facing a poor equilibrium of the earth resource and the earth population resulting from an increasing rise in the world's population. This population growth is also seen in the increasing rise of waste dumped into the environment each year. It is thus important to present a statistics of the world's population.

Figure 1. 1

2021 Statistic on World's population



(Source. Global footprint network (Statista 2021))

Economic growth has mainly come at the expense of the environment since the Industrial Revolution began. While economies, population, and resource demand grows continuously, the size of Earth remains the same. If humanity continues with this trend, Earth's resources will not be able to sustain its population. By the year 2100, it is estimated that the global population will likely reach eleven billion (Jaganmohan, 2021). With the world's resources increasingly being depleted, it is vital to judiciously utilize these resources, with earth overshoot day arriving sooner every year.

A recent study of 30 countries showed that only 20% of them mention biodiversity as a national priority in their reports of SDG progress. The Global Biodiversity Outlook concluded that biodiversity is declining, and that none of the Aichi Biodiversity Targets will be met. Other reports confirm that the planet will not be able to meet 35 of the 44 SDGs because the loss of species and soil degradation. This loss slows progress on the wider sustainability agenda – particularly on targets related to ocean health, well-being, economic equity, clean water and the responsible use of resources. Moreover, this loss may also undermine efforts to address climate change.

However, during the course of this year, South America has shown the start of joint solutions and diplomatic actions such as the resolution from the Permanent Commission of the South Pacific (CPPS), a body that brings together the coastal countries of South America, to prioritize the development of a work plan on sustainable fishing, and so, to contribute to achieving (SDG) 14 to conserve and sustainably use the ocean and its resources. These types of actions are mandatory if the world is to secure the environmental dimension of the 2030 Agenda and thus, support the progress of socio-economic target

In Asia, the latest report by the Economic and Social Commission for Asia and the Pacific (ESCAP) shows the progress has deteriorated on five key SDGs: SDG 2– Zero Hunger; SDG 8 – Decent Work and Equitable Economic Growth; SDG 10 –Reduced Inequality; SDG 11 – Sustainable Cities and Communities and SDG 15 – Life on Land..

Report from Sachs et al. (2022) reveals ranking of countries and their overall score. The overall score measures the total progress towards achieving all 17 SDGs. The score can be interpreted as a percentage of SDG achievement. A score of 100 indicates that all SDGs have been achieved. So far Finland stands out first with a score of 86.51%, Denmark second with a score of 85.63% and Sweden third with a score of 85.19%.

In developing nations, woods, lakes, streams and seas give a noteworthy offer of families' eating regimens, fuel and livelihoods and speak to a valuable security net in the midst of emergency

especially for 78 for each penny of the world's outrageous poor who live in rustic territories. The integrity and functionality of these vital natural assets, however, are increasingly compromised. 60 to 70% of the world's ecosystems are degrading faster than they can recover. Rajiv (2016) reports that India has many environmental issues. Air pollution, water pollution, garbage, and pollution of the natural environment are all challenges for India. The situation was worse between 1947 through 1995. As per information accumulation and condition evaluation investigations of World Bank specialists, between 1995 through 2010, India has gained one of the speediest grounds on the planet in tending to its natural issues and enhancing its ecological quality. Still, India has a long way to go to reach environmental quality similar to those enjoyed in developed economies. Pollution remains a major challenge and opportunity for India. Environmental issues are one of the primary causes of disease, health issues and long term livelihood impact for India.

In today's competitive world, companies have indulged in corporate social responsibility initiative to build a positive image for investors and customers. Moreover, a sustainability strategy integrates the policies and practices to create profits, consider their workplaces, and try to be eco-friendly along their entire value chain. The sustainability mindset also includes social issues like gender equity, ecological awareness, green partnership, green pedagogic actions, or taking responsibility for the environment. Amid growing pressure from investors, many companies across various industries are embracing sustainability reporting on a regular basis.

The international institutions for sustainable development (IISD, 2019) report showcase positive trends with respect to reporting on leaving no one behind and stakeholder engagement. However, it also underlines the continued silence by member states in Voluntary National Review reports on the closing of civic space and discusses how this impacts the ability of all stakeholders to engage and implement the sustainable development goals. As such, all stakeholders are to engage and implement the sustainable development goals for a better future.

In its International Implementation Scheme (IIS) for DESD, UNESCO states that ESD is fundamentally about values, particularly respect for others, including those of present and future generations, for difference and diversity, for the environment and for the planet's resources (UNESCO, 2006). Education enables us to understand ourselves and others and our links with the wider natural and social environment; this understanding serves as a durable basis for building respect. Along with a sense of justice, responsibility, exploration and dialogue, ESD aims to move us toward adopting behaviors and practices which will enable us all to live a full life without being deprived of basic human needs.

Environmental pollution is increasingly a problem in Cameroon like in most African Countries, where the environmental consequences of development cannot be ignored. The major forms/types of pollution in Africa include indoor and outdoor air pollution, land pollution and water pollution. Pollution affects both urban and rural areas. Poor people, who cannot afford to protect themselves from the negative impacts of pollution, end up suffering the most.

In 2012, an estimated 9 million people died from air, water and land pollution, according to the Global

Alliance on Health and Pollution. According to the Institute for Health Metrics and Evaluations (IHME), diseases attributed to indoor and outdoor air pollution were responsible for 1 in 10 deaths worldwide in 2013, and air pollution has become the fourth risk factor for premature deaths, just behind tobacco smoking.

Environmental pollution has attracted much attention all over the world. While cities are generating an ever-increasing volume of waste, the effectiveness of their solid waste collection and disposal systems is declining. In urban centers throughout African countries, less than half of the solid waste produced is collected. Approximately 95% of that amount is either indiscriminately thrown away at various dumping sites on the periphery of urban centers, or at several so-called temporary sites, typically empty lots scattered throughout the city(Ali SA et al., 2022)

In the survey study of Yilmaz and Oz (2004) in Erzurum, a city in Turkey, the same study area with present study, 66% of participants found air pollution to be the most significant environmental problem for the city. In another study from Turkey by Doygun (2005), the environmental problems of Adana, the sixth largest and most developed city in Turkey were examined and it was stated that the city of Adana faced huge problems of water, soil and noise pollution, solid and liquid waste elimination and loss of fertile agricultural areas and rapid economic development - industrialization, population growth and unplanned urbanization -were determined to be the main causes of these environmental problems, making some recommendations for mitigating and managing these problems in the sustainable urban development perspective.

In the city of Abidjan the municipality's solid waste production was around 1,490,000 tons in 2015, and amounted up to 1,650,000 tons in 2018, an increase of 9.4% and is expected to be around 2,000,000 tons in 2030. About 2.5 tons of solid waste is produced daily in the Nangui Abrogoua University, on Abiidjan of which 1.5 tons come from offices and services, and one ton, from university canteens. However, green waste and waste from informal businesses are incinerated in illegal dumps within the university (Jean-Marie P.et al. 2022)

Problems linked to sustainable development which has been observed in the world in general and in Africa in particular, are visible in a developing country like Cameroon.

- **Statistics at National level (Cameroon)**

Sustainability is the foundation for today's leading global framework for international cooperation such as the 2030 Agenda for Sustainable Development and it's Sustainable Development Goals (SDGs). Each of the 17 SDGs has specific targets to be achieved by 2030. The goals and targets are universal, they apply to all countries around the world and reaching the goals requires action on all fronts: governments, businesses, civil society and people everywhere all have a role to play. The UN ranks Cameroon 134 out of 165 countries in implementation of the SDGs with an index of 55.3% (SDG dashboard trend, 2021), thus much needs to be done toward sustainability.

Statistics by Sachs et al. (2022) of Countries overall score which measures the total progress towards achieving all 17 Sustainable development goals ranks Cameroon 134th with a score of 55.55%. This reveals a 0.25% increase in achieving sustainability in the country from 55.3% in 2021 to 55.55 % in 2022. This indicates that much has been done in achieving sustainability nevertheless more needs to be done to improve sustainability in our country. Similarly, the UN 2020 world human development report on the Human Development Index (HDI) which gives a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living, report Cameroon to be at an average level of 56.3% in 2019 and at the 153rd position globally while Norway comes first with a percentage of 95.7%. This report also reveal that Cameroon has had a change of just 1 in HDI rank from 2014 to 2019 showing little progress in our HDI towards sustainability.

Reports from De Chacus and Whannou, (2017) reveals recent evolution of consumption patterns associated to a contemporary lifestyle, which has a great impact on the production of waste and its management in cities. This is accounted for the wide use of biodiversity and some transformation processes of some of its products, which leads to hazardous emissions and waste, such as carbon monoxide from the burning of wood. Indeed, the consumer society appeared with new manufactured products, thus producing new waste (Kaboré, 2009). This change can be observed everywhere and especially in the cities of Cameroon where the plastic bag has become the main means of packaging. This possesses a threat to sustainability.

In Cameroon, woods, lakes, streams and seas give a noteworthy offer of families' eating regimens, fuel and livelihoods and speak to a valuable security net in the midst of emergency especially for 78

for each penny of the world's outrageous poor who live in rustic territories. The integrity and functionality of these vital natural assets, however, are increasingly compromised. 60 to 70 % of the country's ecosystem is degrading faster than they can recover.

Following reports from the world health organization (2020), on air pollution, Cameroon is considered unsafe with an annual mean concentration of PM 2.5 at 73ug/m^3 which exceeds the recommended maximum of 10ug/m^3. Not to mention land and water pollution. The environment is threatened by logging which is up to ninety percent (Anyaoku, 2018), Commercial hunting, and the list continues in Cameroon (Nasong'o and Gabsa).

Satellite imagery from Oct. 12, 2013 shows enhanced air pollution over coastal cities like Douala. Evans and the study's lead author, Peter Knippertz, from the Karlsruhe Institute of Technology in Germany, worry that these pollutants will change the West and central African monsoon, a sensitive atmospheric circulation system that controls everything from wind and temperature to rainfall across huge swathes of the region. (Scientists have previously linked aerosols to changing rainfall patterns in Asia and the Atlantic Ocean.) Population growth in Africa will exacerbate these effects, they say. The sources of pollution in Cameroon are many: car exhaust, wood burning, garbage burning, cooking indoors with fuel stoves, the use of millions of diesel electricity generators, petrochemical plants. "It's not even obvious what source to tackle first," Evans writes.
According to some statistics, transport is responsible for 61% of CO2 emissions released against 11% for manufacturing and construction in Cameroon. The inventory of dioxins and furans (highly carcinogenic molecules and contained in smoke) in 2006 and 2011 revealed the most polluting sources were from uncontrolled combustion, incineration of waste and production of energy from products petroleum). It should be noted that Cameroon has about 66,900 km of roads, of which only 6% are tarred (ECCAS, 2007). Ministerial report shows that there are 200 cancers cases that develop annually in Yaoundé, and that volatile organic compounds cause approximately 13,000 premature deaths due to air pollution by dust. In addition, there are also heavy economic costs related to the costs of consultations and medical care. According to the third UNEP Africa Environment Outlook (AEO-3) report, air pollution is rising in many countries in Africa with carbon dioxide, carbon monoxide, particulate matter, sulphur dioxide, oxides of nitrogen and lead constituting some of the major indoor and outdoor air pollutants. The key drivers of poor air quality in Africa are urbanisation, industrialisation and motorisation which have all led to an increase in outdoor air pollution on the continent. Reliance on solid fuels for cooking, heating and lighting exposes about 90 per cent of people in Cameroon to indoor air pollution, impacting both economies and livelihoods, while contributing to increased emissions of greenhouse gases. In most homes in

Africa, Cameroon not being an exception, wood fuel, charcoal or kerosene or a combination of these is used for cooking. Indoor air pollution affects vulnerable women and children most. In addressing the theme of pollution, the 2017 Environment Assembly, should therefore focus on both outdoor and indoor pollution and indoor pollution should not be marginalized.

Water pollution is another major challenge in Cameroon. The two main phenomenons responsible for this type of pollution are the rapid industrialization and urbanization of our main cities. Industries are very often not willing to treat their liquid or gaseous effluents before they are released into the natural environment. More seriously, industrial zones are not generally distinguished from residential areas, which amplify the effects of pollution on the populations bordering cities such as Douala in Cameroon. Liquid industrial waste, particularly solvent waste, was estimated at 84,290 m3 per year (MINEPDED/ UNDP, 2006). However, the national deposit of solvents and waste paint must be at least three times that volume.

Untreated ballast water from ships equally stands as major source of pollution. The quantities of ballast transported on board vessels vary, ranging from Hundreds of liters to more than 100,000 tonnes of water, depending on the size and use of the ship which carry up to 3,000 species are discharged untreated into our seas. Other causes of water pollution are linked to the poor management of wastewater in our cities due to uncontrolled urbanisation. As a matter of facts, the use of streams as waste dumps or as emptying places for septic tanks is a current practice which leads to groundwater pollution in the main cities such as Yaoundé and Douala in Cameroon leading to waterborne diseases. In September 2010, more than 385 Cameroonians lost their lives due to cholera outbreak. Here, the general rule is the absence of wastewater collection and treatment systems (sewers, sewage treatment plants, etc.). Less than 1% of sewage generated is treated in our cities in such facilities. Where these treatment plants exist, they are inadequate to local general conditions, which affects their proper functioning and hence their purifying capacity, which thus becomes mediocre. The result is a concentration of pollution in these areas and their surroundings with aggravated effects. We must add to these human causes, the poor drainage system of some cities with rather flat relief such as Douala. The wastewater flow is not favored, which leads to their stagnation, their infiltration into the ground and everywhere the pollution of the groundwater bodies which in this case are not deep. Depending on the source, there are several types of pollution in cities: bacteriological pollution, organic pollution, domestic pollution, toxic chemical pollution, and diffuse pollution that include a wide variety of sources. The main manifestations of water pollution are physico-chemical, bacteriological, biological, epidemiological or (eco) toxicological. The presence of abnormally high suspended solids such as various debris (erosion products, organic

matter, etc.) or dissolved substances such as ammonium, nitrate, Nitrites, phosphates, etc.), certain toxic chemicals such as mercury, arsenic, lead etc. This considerably alters certain water characterization parameters such as color, hydrogen potential (PH), chemical oxygen demand (COD), Temperature, hardness ... which are in fact indicators of the physicochemical quality of the water.

Soil pollution can be diffuse or local, industrial, agricultural (following the massive use of fertilizers or pesticides that infiltrate the soil). Agricultural pollutions can have several impacts on human health, by touching ground water on the one hand and contaminating by bioaccumulation. The presence of pesticide residues in some fishes and plants that are sold in some markets in Cameroon has been found to be as a result of the uncontrolled use of pesticides in fishing (Gimou et al., 2007). This uncontrolled use has equally been the source of to the nearly two million tons of contaminated soil with POPs pesticides spread in the ten Regions of country. In Cameroon, the average production of solid household waste per person per day was known to fall between 500 and 600 g in 2006 (MINEP, 2006). Despite the rigor observed in the work of waste collection and management institutions, household solid wastes are still discharged by tens of tons each day into the environment. For example, out of 200.4 tons of garbage produced daily in Yaoundé I, 60% is discharged into the environment, that is 119.8 tons. 56 uncontrolled landfills were counted on an area of 8.5 km² for a total volume of 12 278.93m3. (Takougand, 2008). Although the law prohibits this practice, the population, faced with the omnipresence of non-biodegradable solid waste generally prefers this option. Such waste as plastic waste is a major source of land pollution.

A study conducted in 2011 by the Ministry of Environment revealed that: Single use plastic waste are largely responsible for the public health problems; they are partly responsible for the flooding of our cities because they obstruct the waterways; they contribute to diminishing agricultural production by blocking the infiltration of water and preventing the development or Root expansion in the soil; they promote the development of vectors diseases such as malaria and cholera just to name but a few; they are responsible for the death of several herds of cattle especially in the northern part of our country, where these animals confuse them with food or vegetation.
Accordingly, the investigation revealed that: 58% of consumers get rid their plastic waste in their immediate environment; 22% hand them over to some collectors and 20% burn their plastics in the open air.

1.2.2. Causes of environmental hazards

By every indication, the environment is the life wire of any given society. It provides habitation and means of survival for the local populations and fauna. It constitutes in like manner an immense and rich biodiversity and medicinal plant reserve. Unfortunately, these are not preserve thanks to some hazardous human activities.

The unruly demolition of forests and natural resources, the gradual dissipation of variegated biological species, soil degeneration, the effects of global warming, pollution and the destruction of ozone layer make the preserve of the environment and life on land compelling. Disordered exploitation of natural resources, mismanagement of natural resources, disordered deposit of waste and increased contamination of sea and underground water. There is a lot of waste of our natural resources, misuse of natural resources, poor disposal sewage and other waste, which turns to degrade our environment, poor management and poor governance.

WWF (2020) report that Cameroon's rich environmental potential is going under serious damage from natural and man-made causes such as climate change, drought, floods, desertification, deforestation, multifaceted pollution, coastal and river erosion. Cameroon rich biodiversity has been unruly demolished by poaching particularly. Poaching in the Congo basin in general remains the major threat to more than 80 species and sub species of mammals. Added to this, are other activities such as forest exploitation, mining, agriculture expansion remain a constant treat to biodiversity.

The main cause of loss of biodiversity are deforestation, global warming, overpopulation, pollution and indiscriminate disposal of plastic are few of the major causes for loss of biodiversity. In fact human beings have deeply altered the environment, and have modified the territory, exploiting the species directly, for example by fishing and hunting, changing the biogeochemical cycles and transferring species from one area to another. The threat to the human environment from the progressive deterioration of the biosphere has emerged as a central issue of this decade. Accelerated industrialization, rapid urbanization, the pattern of increasing consumption of natural resources, the development of modern agricultural and transportation techniques, and rising standards of living have not only contributed to modify the ecological balance on which the quality of the environment depends, but present great threats to human survival. The high rate of technological change has increased pollution above the self-cleansing capabilities of the environment.

The stability or degradation of ecosystems has largely resulted from pressure from human activities and management methods of the resources under use. Plantation and subsistence agriculture,

logging, grazing, bush fires and, to some extent infrastructure (road building and urbanization), have contributed to ecosystem degradation. Hunting for game, forest clearing to establish farms and the quest for new pastures as fodder for cattle are mostly achieved through bush fires. The mountain, tropical woodland savannah and semi-arid ecosystems are the zones affected by these practices. Comparative studies in the CEMAC region showed that Cameroon registered 59% habitat loss in 1986. It has been estimated that 96.5% of the original forest cover of the Bamenda Highlands above 1.50 metres altitude has been lost (Cheek et al, 2 0).

According to De Chacus and Whannou (2017), the chemical components contained in plastic waste show that their careless disposal in nature can cause serious consequences for health, public safety, soil and the environment. Non-biodegradable plastic materials released into nature are relatively stable substances against which soil microorganisms have difficulty acting. Non-biodegradable plastic remains intact in the soil due to its slow degradation process. Their presence in the ground also presents certain risks which may be linked to the nature of the plastic itself. Water and air exchanges with the ground can be disturbed and interfere with the natural metabolism.

Plastics and other non biodegradable waste seriously affect the soil because they prevent the passage of ultraviolet rays, necessary for the normal development of the physiological process of plants. The presence of plastics at the immediate periphery of plants can also prevent plant competition in the biotope.

On the other hand, combustion most often releases fumes that can be toxic. We recall at this level that in the CREPA report (2011), it appeared that during the surveys, 92.66% of the people surveyed said they used plastic bags every day. 70% of those who use plastic bags throw them away in the street after use. 11% cremate them; 6% use them to make fire and 5.66% do something else with them.

More people are using more resources, but those resources are fast depleting. The Food and Agriculture Organization of the United Nations is predicting that by 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity. We encounter the same problems when we look at available food, minerals and other natural resources. When people occupy a space, environmental problems grow exponentially. As Pujol (2000) puts it, consumption becomes an environmental problem that has social importance from the moment at which the individual and society have to consume in order to live.

1.2.3. Consequences

Impact on Human Health

Environmental illiteracy and stark ignorance of ecological rules that govern land in Cameroon continues to affect health and sustainable development in Cameroon. The greatest effects on the health of individuals and populations result from environmental degradation. Human health might be at the receiving end as a result of the environmental degradation. Areas exposed to toxic air pollutants can cause respiratory problems like pneumonia and asthma. Millions of people are known to have died of due to indirect effects of air pollution. Air pollution cities are among the most polluted in the world. Air in metropolitan cities has become highly polluted and pollutant concentrations exceeds limit considered safe by the World Health Organization (WHO).

The urban air pollution has grown across Cameroon in the last decade are alarming. Some of the most important air pollutants are residual suspended particulate matter (RSPM), suspended particulate matter (SPM), nitrogen dioxides (NO2), carbon monoxide (CO), lead, sulfur dioxide (SO2), etc. (WHO,). The main factors account to urban air quality deterioration are growing industrialization and increasing vehicular pollution, industrial emissions, automobile exhaust and the burning of fossil fuels kills thousands and lives many more to suffer mainly from respiratory damage, heart and lung diseases.

In African cities, piles of waste and garbage are observed, along the roads and in public spaces, due to the absence or lack of control of adequate strategies for household waste management. This situation has a negative impact on the quality of the environment of these localities and the health of the populations through so-called environmental diseases, in particular diarrhea, malaria, cholera and typhoid fever (WHO 2006)

In the countryside, nitrates from animal waste and chemical fertilizers pollute the soil and water, and in the cities, the air is contaminated with lead from vehicle exhaust. About one-half of children under age 3 show signs of harmful exposure to lead, defined as to or more micrograms of lead per deciliter of blood (IIPS & ORC Macro, 2000). The illness and pre-mature deaths due to ambient suspended particulate matter (SPM) in the air in mega cities of Calcutta, Chennai, Delhi and Mumbai have risen significantly in less than five years (Rajiv et al. 2016). The indoor air pollution may pose an even greater hazard for human health. Cooking and heating with wood, crop residues, animal dung, and low-quality coal produce smoke that contains dangerous particles and gases.

When fuels such as these are burned indoors, using inefficient stoves and poor ventilation, they can cause tuberculosis, other serious respiratory diseases, and blindness (Mishra, Retherford & Smith, 1999). In fact, indoor air pollution from cooking and heating with unsafe fuels has been designated

by the World Bank as one of the four most critical environmental problems in developing countries. In the study of Chau et al. (2002) in Hong Kong, the exposure of the Hong Kong people to nitrogen dioxide (NO2), respiratory dust (PM10) and carbon monoxide (CO) pollutants experienced by different age groups was investigated. It reveals that these gasses generally have very harmful effects on the health of the population.

The consequences of garbage on health and the environment have been addressed by several researchers. It appears from the research of Domenach and Picouet (2000) and the studies carried out by Coulibaly (2006), Sanou (2005) and Tiendrebeogo (1999) that the proliferation of waste is a source of harmful insects, lung and carcinogenic diseases, visual nuisance and animal morbidity. The gas emissions in the event of waste burning lead to the pollution of the atmosphere. The waste also spoils the living environment and clogs the pipes. In agriculture, they are the cause of lower yields. In France, it has been discovered that two essential compounds (phthalates and bisphenol A) used in the manufacture of everything plastic are a source of cancer in the thyroid glands and promote male and female infertility (www. Santé-gouv.com, 2009).

Loss of Biodiversity

Biodiversity is important for maintaining balance of the ecosystem in the form of combating pollution, restoring nutrients, protecting water sources and stabilizing climate. Cameroon is home to about 9000 species of plants, 300 species of mammals, 916 species of birds, 165 species of reptiles, 200 species of amphibians and more than 1500 species of butterflies. Its diverse ecosystems are further representative of 92% of Africa's ecosystems resulting in the reference to Cameroon as Africa in miniature. (UNEP 1997; MINEP 2008). Despite this rich biodiversity and the conservation measures established, poaching in Cameroon particularly and in the Congo basin in general remains the major threat to more than 80 species and sub species of mammals. Added to this are other direct human induced activities such as forest exploitation, deforestation has lead to climate change as a result of reduced number of trees to absorb gases such as CO2, and has also lead to the greenhouse effect.

Increase deforestation has led to loss of habitat of several animals and some plants. It has also lead to floods and landslide and destruction of habitats of some terrestrial animals. Over exploitation of natural resources without replenishing has led to the extinction of some plant species and food scarcity as a result the healthy nutrition of man as well as his wellbeing is a stack.

Majority of Cameroonians depend on biodiversity for their food, shelter, and health especially in rural areas. Due to the importance of biodiversity, Government is placing a lot of emphasis on

economic planning. The variety of ecosystem services enjoyed by many communities depends strongly on the variation of agro-ecological zones and biodiversity richness. A loss in biodiversity will greatly affect the value of food, provision of medicine, and shelter, the economy, employment and tourism.

- **Food**

More than 90% of the rural population and about 80% of the urban population depend on biodiversity for their food. Surveys have shown that the main forest foods can be grouped into seeds, green vegetables, spices, mushrooms, wines and honey. Bush meat and fish both fresh water and marine are main sources of proteins and serve as the principal diet for rural population especially the Bakas of the South and East Regions. The role of organic fertilizers is mainly known by the rural and urban population. A loss in biodiversity will thus reduce the availability of food crops for man.

- **Medicine**

Most rural communities in Cameroon depend on plant and animal parts for medicine, a loss in biodiversity will affects the medicinal help some plants offer to humans. This practice does not end in the rural areas but has also extended into big cities. Sometimes this might be due to lack of proper health care facilities, but we still have many Cameroonians who believe that some illnesses can only be cured by medical tradi-practitionals using these specific biological species. Ethno botanic studies in the Korup Area in the South West Region named over 500 plants or plant parts used by the indigenous population for the treatment of various kinds of diseases. Excess use of these plants for medicinal purposes without thinking of their conservation may lead to extinction of some plants.

- **Shelter**

In Cameroon, the construction of houses uses at one point or the other, materials from the wild which consist of sticks, timber, leaves, bark, ropes, grass, etc. Grass is predominantly used as the roofing material in villages in the savannah and Sahelian regions while thatched palm leaves are used in the forest regions and areas where different palm species grow. Research carried out by Duncan et al, (1989) identified 63 plant species capable of yielding planks, building poles, and carving in the forest zone alone while 8 were seen as the source of gums, rubber and resins. The leather and skins are valued for furniture while other animal parts are used for decoration, game trophies, charms, musical instruments, kitchen utensils, arms and other cultural values. The use of biodiversity products for construction and clothing has an impact of the sustainable proportion of biodiversity.

- **Employment**

Biodiversity employs about 84.2% of the country's population (MINEF, 1996) it does need to be preserved. A large proportion of the Cameroonian population is engaged in biodiversity-related activities. Those in rural areas are farmers, hunters, grazers, fishermen, tradi-practitioners and in small crafts like weaving, carving, wine and oil production. Agro-industrial establishments employ many workers of various categories. A loss in biodiversity will thus affect the employment rate offered by this sector.

- **Commerce**

Since the beginning of last century, there have been increased economic activities in internal and external trade on commodities from various forms of biodiversity**.** The principal export commodities have been cocoa, coffee, rubber, timber, bananas, etc. Cameroon's trade partners are countries of the CEMAC Sub-region mostly for food commodities while Europe, the USA and Asia trade in cash crop items. The commercial importance accorded to animal products from non-conventional breeding and NTFPs has continued to rise. The internal trade flourishes between various regions as evidenced in the commodity markets within the country. If biodiversity isn't conserved, the reduction of cash crops will lead to a reduction of commercial export activities

- **Tourism**

Eco-tourism has continued to be a major foreign trade activity in Cameroon. The national parks, the endemic plants and animal's species as well as new discoveries of plants, have continued to attract tourists in Cameroon. The number of tourists visiting Cameroon is constantly increasing. For example, in 2013, 912,000 international tourists has been registered against 451,441 in 2006; an increase in the relative value of more than 100% (INS, 2013). Destruction of biodiversity will thus hamper the activity of tourism and the economy, which this activity brings to our country

Ozone Layer Depletion

Ozone layer is responsible for protecting earth from harmful ultraviolet rays. The most important reason for ozone layer depletion is the production and emission of chlorofluorocarbons (CFCs). This is what which leads to almost 80 percent of the total ozone layer depletion. There are many other substances that lead to ozone layer depletion such as hydro chlorofluorocarbons (HCFCs) and volatile organic compounds (VOCs). Such substances are found in vehicular emissions, by-products of industrial processes, aerosols and refrigerants. All these ozone depleting substances remain stable in the lower atmospheric region, but as they reach the stratosphere, they get exposed to the ultra violet rays. This leads to their breakdown and releasing of free chlorine atoms which

reacts with the ozone gas, thus leading to the depletion of the ozone layer. Global warming is another result of environmental degradation.

We need to think further ahead than we habitually do, in many cases, this will mean envisioning the world: I would like to see when my own child is my current age. What opportunities will there be? What threats will we face? Increasingly, we will be asked to do this anyway, whether we like it or not to think about actions we need to take now in order to deliver outcomes 40 years ahead.

1.2.4. Measures taken

Taking cognizance of the fact that we have pushed the world to an utterly unprecedented condition Ferre and Hartel (1994, p.238), pointed that we are living in a "post-natural world" in which we have so tampered with the atmosphere that it has had a devastating impact on the weather. According to Zamudio (2005), humanity faces the global problem of planning for the proper growth in relation to the natural conditions of life, which have been damaged by industrial civilization.

Temperatures and rainfall are no longer to be entirely determined by some separate, uncivilized force; but instead, they have become partly a product of our habits, our economies and our ways of life. Against this background, Ferre (1994) declares that we are condemned to be morally responsible towards the environment. Soewu (2004) puts it "a degraded environment can only offer a degraded quality of life". If we really desire to sustain and improve upon the present quality of life, then it is the collective responsibility of every living human being to secure the quality of the environment. The direct result of this general concern is the initiatives for the protection and conservation of the natural world 'if only for prudential reasons.

1.2.4.1. Regulatory Measures

Over time, how to sustain the natural environment and our planets resources at the same time as develop wealth and well-being for a growing population has become very paramount. This monumental task has been defined in the concept of sustainable development (SD). It is worth noting that the tropical forest zone covers 82.5% of the national territory and land under cultivation is estimated at 3% of the national territory (MINEF/UNEP, 2010). While deforestation through agriculture, logging and bush fires was estimated at 200.000 ha/year; the population that depends on wild products for food and agriculture has continued to rise during the past 10 years. To ensure a considerable use of our natural resources and conserve our biodiversity for a sustainable future, the government in alignment with some prescription put forward by the UN, UNESCO and other

international bodies for environmental protection and sustainability, has established a large number of laws and regulations on the environment and sustainable development. This aims at improving sustainability in the country.

Law no. 96/12 of 05 august 1996 relating to environmental management lays down the general legal framework for environmental management in Cameroon. It stipulates that the environment constitutes a national common heritage in the Republic of Cameroon. It is an integral part of the universal heritage. Its protection and the rational management of the resources it provides to human life are of general interest. These resources concern mostly the geosphere, the hydrosphere, the atmosphere, their material and immaterial content, as well as the social and cultural aspects they comprise.

Cameroon also has national policies and corresponding objectives assigned by the Ministry of the Environment, Protection of Nature and Sustainable Development (MINEPDED). Some of these policies include declined; integrating the principles of sustainable development into national policy making, sustainable management of natural resources, the fight against pollution and nuisances, improved governance and strategic management of the environment, nature Protection and Sustainable Development sub-sector.

The educational sector also has policies like the Clean and green Schools instituted in 2019 by the minister of secondary education, the revision of school curricula to gear towards sustainability, as well as the use of the CBA teaching approach.

The Decree 2008/064 of February 4, 2008 setting the terms of management of the national fund for the environment and sustainable development; Decree No. 2012/2809/PM of September 26, 2012 setting the conditions for sorting, collection, storage, transport, recovery, recycling, treatment and final disposal of waste so as to avoid them tampering with life on land.

We also have the joint decree N ° 004 / Minepded / Mincommerce of October 24, 2012 Regulating the manufacture, import and marketing of non-biodegradable packaging. In its article 3, this decree stipulates that any authorized manufacturer, importer or distributor of non-biodegradable packaging is responsible for the management of its waste. It provides for measures aimed at limiting the production and promoting the recycling, reuse and other forms of recovery of the waste resulting from this packaging. In Article 4, it adds that the manufacture, import and marketing or distribution of non-biodegradable packaging are subject to obtaining a prior environmental permit in order to ensure the traceability of their recovery, recycling and /or destruction in an environmentally sound

manner. This environmental permit is issued by the Minister responsible for the environment. In addition, any manufacturer, importer or distributor of non-biodegradable packaging draws up and implements a waste management plan as well as a related monitoring mechanism. The plan mentioned takes into account the orientations of the National Waste Management Strategy.

The Government lays importance on biodiversity through the signing of bilateral agreements and international conventions related to biodiversity. In Decrees creating new ministries, more than seven ministries related to biodiversity were formed; they include MINADER, MINEPIA, MINFOF, MINRESI, MINEPDED, MINCOM, MINTOUL, MINEPAT, MINATD and MINEE. There are national laws and decrees of application (biosafety law, environmental law, Forestry and wildlife law, orientation law on territory amenagement and sustainable development, etc.) and international conventions (CBD, CPB, ITPGRFA, including Nagoya Protocol) on the management of biodiversity and products.

This collection brings together in a single document most of the legislative and regulatory texts relating to environmental issues with a view to promoting the effective integration of environmental considerations into all human actives in Cameroon.

Persuasive measures

The relevant issue in the management of biological resources is the mastery of the various forms of resources, the management strategies and the need to exploit them in a sustainable manner for the welfare of the population and the economic advantage of the nation. This is why government sees the necessity to adopt Sectorial policies and regulations accompanied by appropriate institutions to administer each sector accordingly.

The Ministry of Agriculture and Rural Development caters for agricultural resources management and planning; the Ministry of Livestock and Fisheries focuses on domestic animals and fishery resources, while the Ministry of Forestry and Wildlife handles wildlife and forestry resources. The Ministry of Scientific Research and Innovation through its research institutes conducts and expands research in different fields and ensures that research results are available to all stakeholders. Government cooperates and receives assistance (technical and financial) from international bodies on the sound management and sustainable use of resources from biodiversity. National organizations engaged in biodiversity-related activities assist government in sensitizing particularly the rural population and provide the much needed manpower for managing the resource in all the sectors.

The laying down of policies in Agriculture, forestry, Livestock, fishery and environment and enforcing these regulations; Restoration and creation of new Protected Areas including marine protected areas. From 1996 to 2013, protected area coverage rose from 1164842 to 9124666 hectares, UNEP /MINEP, MINFOF (2013). Agricultural Techniques and Technologies are being adopted in farms and plantations.

The Ministry of Agriculture and Rural Development continue to sensitize the rural population on the use of modern agricultural techniques and fishing methods that will not jeopardize future activities in the sector. Illegal forest exploitation, poaching and over-harvesting are among the practices that government is trying to reduce. Hunting using the burning of the vegetation or the felling of wild food producing species is being discouraged. Traditional Knowledge is valued through progressive surveys and ethno botany studies in biodiversity hot-spots throughout the country. The Access to resources and the Benefit sharing principle and resource property rights issues are closely followed up for implementation within rural communities. Continuous conservation and protection of habitats and ecosystem is followed up with the identification of major invasive species. Progress in this domain has been the establishment of a list of the major invasive species as well as a White and Black List in Cameroon. After enacting the law on Biosafety, efforts are now underway to prepare a draft law on biosecurity. The Cameroon Biosecurity Project which began in 2011 is working along those lines.

Plans for the future are contained in the various actions and strategies already developed in each biodiversity activity sector. From the national perspective, Government applies the "Participatory Approach" in the management of all biodiversity-based activities. There is the endeavor to encourage and finance Non Governmental Organizations (NGOs), greater attention in the financing of agricultural activities through the creation of a Farmers' Bank and the multiplication of producer cooperatives to enable the farmer/grazer/fisher folk to have fair prices for their labor.

Over the past ten years Government has embarked on a program of improving the Protected Area coverage by:

Recovering the PAs which had been lost through encroachment by the population. Bafut-Ngemba, Bali-Ngemba Forestry reserve, Bomboko, Ndoko, Ototomo Forest Reserves, Loum , Santcho and many others are among the reserves encroached by the population.

The creation of new PAs in many parts of the country including proposed Marine PAs – Bakassi Peninsula Mangroves, Douala Edea Fauna Reserve, Rio del Rey. The creation of marine Protected

Areas has been a national priority since 1995 (WB, IUCN 1995). In Kupe Mwanenguba alone, about

230000 hectares have been earmarked for new creation, (Cheek 2004). As a whole from 1996 to 2008, the total area of PA has doubled from 1164842 to 3482741 hectares.

Government has adopted specific policies and appropriate laws for managing biological resources in a sustainable manner. The agricultural, forestry, wildlife, fisheries, land and environment policies including their corresponding laws are being implemented to safeguard the resources. This is shown by the existence of external services and law enforcement personnel especially in the Forestry and Wildlife sectors. Enforcement measures are weak, and there is still room for illegal exploitation of biological resources. According to an assessment carried out within the framework of implementing principle10 in Cameroon it has been revealed that despite the gamut of legislation and regulations existing within the environmental fields, there is weak implementation.

The implementation of biodiversity related conventions is Cameroon's priority in the biodiversity conservation agenda. Institutional arrangements are indicative of this good will. There is a Ministry of the Environment and Protection of Nature (MINEP) distinct from the Ministry of Forestry and Wildlife (MINFOF). Other administrations are in charge of agriculture while the MINEP ensures that all regulations related to the implementation and management of the forest and wildlife resources are strictly applied. It is the Focal Point Ministry of the CBD, UNFCCC, and UNCCD. However coordination with other key administrations is weak. They ensure extension programs to attract encourage farmers and herdsmen towards new production; provision of inputs and improved planting materials; multiplication of research stations and availability of research results in all the agroecological zones; the domestication of plant species whose products are in high demand; like leaves of *Gnetum spp*, (Eru, Okok) seeds of *Irvingia spp*, (Bush Mango) *Ricinodendron heudelotii* (Njansang) already feature in the international markets but so far only *Gnetum* is being domesticated and not yet at commercial quantities (CIFOR, ICRAF and IRAD.

Furthermore, the domestication of wild animal species like cane rats, giant rats, frogs, quails, are practiced to maintain cultural habits and as well as the need to improve income of the local population (IRAD, ICRAF, DABAC, PAPENOC, Heifer Project International, PEAC.); the increase in production centers for propagation intended for conventional and nonconventional breeding (MINEPIA)as well as for the improvement of vegetative material(IRAD, MINADER). Enacting the law N°94/01 of the 20 January 1994 related to the sale of bush meat and NTFPs

including products from domestication and increase of the institutional provisions and improvement of the legal provisions to assist in management and control processes.

Other persuasive measure put forward by the government is the organization of sensitization campaigns on environmental protection and sustainable development. Setting up of days focused of the environment such as the 5th June which is the World environment day, the 17 June which is desertification day, the 16th September which is the Ozone day. These days have specific messages to draw the public attention on the need of conserving our environment to reduce environmental hazards.

At the international level, there is every endeavor to implement the biodiversity-related agreements, cooperate with other international organizations, particularly those represented in the country like the (FAO, WWF, UNEP, UNESCO) on matters of biodiversity resource management. Cooperation ties with world bodies will brighten Cameroon's prospects through experiences and success stories in biological management and to improve the state of food and agriculture security. During the last few decades the world communities have, under the umbrella of the UN, agreed upon jointly addressing SD. As a response, Education for Sustainable Development (ESD) has been launched as one of the key answers to dealing with sustainability (Pauw et al., 2015). ESD has been adopted globally as a consequence of the UN Decade for Education for Sustainable Development (DESD; 2005–2014), which has reshaped curricula worldwide to empower students with sustainability awareness and competences through a holistic interdisciplinary perspective of content and pluralistic learner-centered democratic teaching strategies.

To increase environmental sustainability, a multitude of professional groups have provided guidance to support teachers in incorporating environmental sustainability education (ESE) across the curriculum in primary and secondary classrooms. For example, the National Science Teachers Association (NSTA) provides a position statement that notes, "Environmental Education should be a part of the school curriculum because student knowledge of environmental concepts establishes a foundation for their future understandings and actions as citizens," (NSTA, 2003).

UNESCO and UNEP led the International Environmental Education Program (1975-1995), which set out a vision for, and gave practical guidance on how to mobilize education for environmental awareness. In 1976, UNESCO launched an environmental education newsletter 'Connect' as the official organ of the UNESCO-UNEP International Environmental Education Program (IEEP). It served as a clearinghouse to exchange information on Environmental Education (EE) in general and

to promote the aims and activities of the IEEP in particular, as well as being a network for institutions and individuals interested and active in environment education.

Repressive Measures

The State, faced with the acuteness of the problems relating to the protection of biodiversity, air, human health and the environment in general, is still obliged to advocate for training, sensitization, standardization, control, without forgetting the possibility of sanctions.

In 2006 the country hosted the African Forest Law Enforcement and governance (AFLEG) conference which aimed at curbing corruption and poor governance in the forest sector and the environment as a whole. However, the Minister in charge of Forestry and Wild life in collaboration with some NGOs, has recently taken severe measures to sanction defaulters in Forestry and Wildlife resources. The Minister of State Lands equally shut down some clandestine land occupants, but the farmer grazer problem remains a headache till today, (Njamnshi et al, 2008).

1.3. Statement of Problem

Sustainability as a tool helps us adapt strategies in a modern world to uplift economies without exhausting natural resources. In September 2015, under the aegis of the United Nations, the 2030 Agenda for Sustainable development and its 17 sustainable goals (SDGs) were adopted by all member states Cameroon inclusive. The goals address the global challenges faced by humanity in all walks of life and aim to achieve a sustainable future for all. These goals has as objective to reconcile economic growth, environmental balance and social progress, ensuring that all people have the same opportunities and can lead a better life without compromising the planet. Various actors are expected to actively contribute to achieving the SDGs. In spite the laid down objectives of sustainable development, man's action has not permitted the smooth attainment of these objectives as observe in the World as a whole and in Cameroon in particular. This is seen in man's indiscriminate use of natural resources and dumping of waste in to the environment. These hazardous actions has led to some consequences such as the loss of biodiversity, poor soil quality, pollution of the air, land and water and health hazards.

Given these consequences the state put up certain regulatory, persuasive and repressive measures to encourage individuals protect life on land. Some of which include laws and rules geared towards environmental protection, sensitization campaigns and sanctions respectively. In spite all these measures the population is still not able to put up the right attitude towards the environment to ensure sustainability. This gives rise to the stipulated problem which is the environmental risk

resulting from people's attitude towards the environment. As observed, the measures laid down by the state and its partners have not permitted the attainment of the objectives of SD. These limitations in the measure has favored the growth of undesirable attitudes as far as the environment and protecting life on land is concerned. This observation has permitted us to address this problem in the perspective of Science of education in general and in Management of education in particular.

1.4. Theoretical background

The problem of environmental risk resulting from people's attitude towards the environment is studied in science education in general and management of education in particular. This study is made possible by the use of certain theories and theoretical models. Amongst these theories we have the planned behavioral theory by Ajzen and the Triple bottom line theory by Elkington, and the social learning theory by Bandura. In the framework of the work we chose the planned behavioral theory by Ajzen and the Triple bottom line theory by Elkington. The theory of planned behavior by Ajzen states that behavioral achievements depend on both motivation (intension) and ability (behavior control). It focuses on three core components, namely; attitude, subjective norm, and perceived behavioral control, which together shape an individual's behavioral intentions. According to this theory, if people evaluate the suggested behavior as positive (attitude), and if they think their significant others want them to perform the behavior (subjective norm), this results in a higher intention (motivations) and they are more likely to do so. A high correlation of attitudes and subjective norms to behavioral intention, and subsequently to behavior, has been confirmed in many studies. In turn, behavioral intention is assumed to be the most proximal determinant of human social behavior. The concept was proposed by Ajzen to improve on the predictive power of the theory of reasoned action by including perceived behavioral control (Ajzen, 1991). In light of this theory and in concordance to our objective, if students are motivated to see the need of care for the environment and keeping it safe for a sustainable future, that intension will grow into a positive behavior with consequent positive actions.

The tripple bottom line theory by Elkington is a concept that postulates that, organizations or institutions should commit to measuring their social and environmental impact in addition to their financial performance rather than solely focusing on generating profit, or the standard "bottom line." It can be broken down into "three Ps": profit, people, and the planet. Profit: In a capitalist economy, an organization's success most heavily depends on its financial performance, or the profit it generates for shareholders. Strategic planning initiatives and key business decisions are generally carefully designed to maximize profits while reducing costs and mitigating risk. In the past, many firms' goals have ended there. Now, purpose-driven leaders are discovering they have the power to

use their businesses to effect positive change in the world without hampering financial performance. In many cases, adopting sustainability initiatives has proven to drive business success. People: The second component of the triple bottom line highlights a business's societal impact, or its commitment to people. Traditionally, businesses have favored shareholder value as an indicator of success, meaning they strive to generate value for those who own shares of the company. As firms have increasingly embraced sustainability, they've shifted their focus toward creating value for all stakeholders impacted by business decisions, including customers, employees, and community members. The Planet: The third component of the triple bottom line is concerned with making a positive impact on the planet. Since the birth of the Industrial Revolution, large corporations have contributed a staggering amount of pollution to the environment, which has been a key driver of climate change. In as much as organization looks forward to making profit, the value of the share and stakeholders as well as organizational impact on the environment is empirical.

The theories presented permitted the identification of some factors that influence sustainable development, among these factors are perception and attitudes, actions, ESD, the level of education, environmental education.

Balakrishnan et al. (2020) carried a studies of 154 undergraduates in five universities in Malaysia. This study revealed that the participants had a positive perception and attitude towards the environmental dimension of sustainability, but lacking in the social and economic dimensions. Sunthonkanokpong (2019) carried out a study on sustainability awareness, attitudes and actions in pre-school teachers in Thailand. Results showed an average overall higher percentage in the categories of attitudes (90%) and action (91%) than for awareness (69%) towards sustainability.

Mulder (2017) stipulate that one's perception and attitude towards sustainable development is not only determined by education, but it may also be determined by external factors such the living environment and society. According to Broady and Ryu (2006) a graduate level of education in sustainable development could influence the level of action taken by the student to be sustainable.

UNESCO (1992) at the ECO-ED conference approved environmental education (EE) as an essential tool for sustainable development. Eneji et al. (2019) posits EE as a leading approach to solve environmental problems and creating a sustainable society.

Erhabor et al. (2016) carried out a study on the impact of environmental education on the knowledge and attitude of students towards the environment, to assess students' level of knowledge and attitude towards the environment for a sustainable environment. The survey was conducted on

130 respondents who were full time students of environmental education in a federal university in Edo state, Nigeria. The result revealed that high level of knowledge and positive attitude towards the environment among the students. Also it was observed that the relationship between their knowledge and attitude towards the environment is a negative, little or no relationship. Therefore, it was concluded that environmental literate students especially in tertiary institutions are being nurtured to foster EE in Nigeria. Thus the researchers recommend that more needs to be done to promote and encourage EE at all levels in the country especially by the government and its agency to ensure effective implementation; nongovernmental organizations and international bodies all have a role to play in the country sustainable development goals.

In another study, Özmen et al. (2005) in Turkey conducted over 410 student subjects; it was found that 84.9% of the subjects do not take part in the environmental protection activities. From the answers participants gave about the actions to be taken against environmental problems, it was seen that the first thing they mentioned was to increase the environmental awareness and sensitivity of people through education, followed by other alternatives, such as using advanced technologies, taking efficient legislative and regulatory actions etc. In spite of a global commitment to EE for SD as a teaching approach, there is very little empirical evidence for the extent to which EE is implemented in classrooms, and the effects EE for SD has on student outcomes such as their knowledge, attitudes, and behavior towards SD and most especially environmental sustainability.

In a research, to evaluate the effects of an environmental education focused on improving students' awareness of wild vertebrates and their ecological functions and evaluate whether prior exposure to environmental education could enhance the effects of the intervention, four schools in a highly biodiverse shade coffee producing region in Mexico were sampled. Two of the schools had received environmental education as part of a community program, while the other two had not. In all schools a targeted intervention by providing information on wild vertebrates and their ecological functions.

Using questionnaires, the awareness of the students before and after the intervention was assessed. Results revealed that intervention improved students' awareness of wildlife and that this effect was strongest in students who had attended the Community Program. This results contribute to Sustainable Development Goals 11 and 15 by showing that interventions can help achieve specific conservation goals (Andresen et al., 2020). Environmental education can condition people's awareness, improving the assimilation of knowledge for caring for the environment.

Archibald (2010) in their work on predictors responsible for Environmental behavior we examined the relative contribution of eight variables in predicting responsible environmental behavior. Scores on a validated behavior instrument served as the criterion. High and low behavior groups selected from 171 respondents were compared using members of midwestern Sierra Clubs and Elderhostel programs as subjects. Multilinear regression analyses were used to determine the performance of each predictor variable and to ascertain the most parsimonious set of variables that predicts environmental behavior. Seven of eight variables were found to be statistically significant. They were: (1) level of environmental sensitivity, (2) perceived knowledge of environmental action strategies, (3) perceived skill in using environmental action strategies, (4) psychological sex role classification, (5) individual locus of control, (6) group locus of control, and (7) attitude toward pollution. The one non-significant variable was (8) belief in technology. Stepwise regression showed that the best predictors for all respondents were variables 1, 2, and 3 stated above. Results imply that the three major behavior predictors (perceived skill in and knowledge of environmental action strategies, and environmental sensitivity) need to be addressed in curriculum development and instructional practice.

The factors which have just presented show that there are many elements which play a role in the adoption of behaviors related to sustainable development. The most pertinent factor in our context is environmental education. In same light the social learning theory shows that individuals learn better when in a group. We expect individuals in a learning environment easily adopt behaviors linked to sustainable development. This observation seem to reveal the contrary. It is this gap which permitted us to formulate the following research questions.

1.5. Research Questions

1.5.1 The General Research question

To what extend does environmental education influence sustainable development in protecting life on land in some selected secondary schools in the Yaoundé VI sub-division?

This research question is operationalized into four modalities of environmental education: education on waste management, education on gardening effects, education on green partnership and education of green pedagogic actions.

1.5.2 Specific Research questions

i. To what extend does the education on waste management influence sustainable development in some selected secondary schools in the Yaoundé VI sub-division? ii. To what extend does

education on gardening effects influence sustainable development in some selected secondary schools in the Yaoundé VI sub-division? iii. To what extend does education on green partnership influence sustainable development in some selected secondary schools in the Yaoundé VI sub-division? iv. To what extend does green pedagogy actions influence sustainable development in some selected secondary schools in the Yaoundé VI sub-division?

1.6. Research Objectives

1.6.1 General research objective

The main objective of this study is to assess the impact of environmental education on sustainable development in protecting life on land in some selected secondary schools in Yaoundé VI subdivision in the center Region of Cameroon.

1.6.2 Specific research objectives

i. To study the link between education on waste management on sustainable development in some selected secondary schools in the Yaoundé VI sub-division. ii. To study the link between education on ecosystem and gardening on sustainable development in some selected secondary schools in the Yaoundé VI sub-division.

iii. To study the link between education on green partnership on sustainable development in some selected secondary schools in the Yaoundé VI sub-division.

iv. To study the link between green pedagogy on sustainable development in some selected secondary schools in the Yaoundé VI sub-division.

1.7. Significance of study

The study sets out to establish the relationship between environmental education and sustainability intension. In the light of this rationale, the study is significant because it will expose the advantages and realities of environmental education practices towards sustainability intension in the Yaoundé VI sub-division in the Centre Region of Cameroon to the government, the policy makers, parents, the school administrators, teachers and even the students.

1.7.1. Empirical significance

Several works have been done on sustainable development to protect life on land. These works have been done in the some European and developed countries for the fight against pollution, global warming where much attention is given. Our study focuses in Cameroon and Yaoundé VI to be precise. This study is going to contribute knowledge in a new area in existing literature in the field

of environmental and sustainability literacy as well as in the conception and planning of educational programs in Cameroon precisely in educational sustainability. Our work focuses on ways encourage the teaching of environmental education in secondary schools by creating partnerships with Sustainable non profit organization, improving waste management, reinforcing gardening practices to focus on greening schools in municipality of Yaoundé VI. It can also function as reference for other studies to be done on environmental education for sustainable intensions in Cameroon. This study will also bring a new input to the development of prevention and awareness-raising actions as carried out so far by the Ministry of the Environment, Forests and Nature Protection. To explain individual behavior with respect to sustainable development and protecting life on land, we made use of the planned behavior theory. Contrary to other studies who used the reasoned action theory or the social learning theory, our study made use of the planned behavior theory to operationalized sustainable development in protecting life on land. In addition we made use of a correlational study to access the relationship between environmental education in protecting life on land.

1.7.2. Pedagogic Significance

This study is expected to provide information and empirical evidence on the need of environmental education for sustainability. It will make the government to be more realistic in their policy adaptation, implementation and evaluation of education on environmental education for sustainability in school curriculum in a broader perspective and in the secondary education curriculum to be specific. This is because the secondary school department is a very impactful unit of the educational system and their implication in sustainability will go a long way to realize the objective of global education policies. The policy makers, educational planners and program developers will be provided with valuable information that will lead to consistent and well defined training policy for the effective implementation of EE for sustainability. Educational planners could be made to see the necessity of investing more funds in waste management and recycling, education on ecosystem and gardening, education on green partnership and green pedagogic actions as well as defining conditions for handson and interactive activities such as workshop seminars and exchange programs with students and teachers of other countries around the globe. This will greatly contribute to impacting sustainability intensions.

Fonkeng and Tamajong (2009) points out, the classroom teachers are overlooked as essential members of the "diagnostics team" which leads them to act as "counselors, psychologist, medical specialist, social worker and medical practitioner. The information that will be generated from this

study will permit teacher transmit the required environmental inclined skills to students for sustainability and employability, such that will be able to contribute to the socio-economic development of their country and will easily survive in the 21st knowledge based economy.

Knowledge on EE will promote critical and creative thinking skills in learners, and inspires them to become more engaged with their communities. It will permit them understand why the environment is important and provides them with the building blocks they need to live eco-friendly and sustainable life.

1.7.3. Economic significance

The economy is an important aspect of the society and needs to be sustained. Our study will equally support the economy through the creation of employment. Acquiring skill in gardening and waste management, will permit an individual be gain self-employment and also create industries in this sector to employ others. This will go a long way to improve the unemployment rate of the country.

Effective implementation of gardening practices will help in improving plant yield and raise income on the Food and Agricultural sector through the provision of food crops and cash crops. This will lead to a reduction of individual expenditure in food purchase, while the cash crops will be sold to improve individual's economy.

In addition, this study will allow the preservation of human capital through the reduction of the number of people killed by diseases due to the health issues resulting from environmental pollution and loss of biodiversity.

1.7.4. Environmental significance

Our study will permit individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. It will also help in building the natural world, provide knowledge and method to solve complex environmental issues which also gives advancement to productive economies and harmony among communities. As a result, individuals will develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions towards conservation of biodiversity, reduction of deforestation and burning of wood as well as reducing the health impacts of air and water pollution through man's hazardous attitudes towards the environment. This study will permit us to better sensitize the population on the consequences of hazardous attitudes, on the environment and on the economy of the country. Indeed, by informing the populations about these elements, this would make it possible to reduce the diseases linked to these consequences.

1.8. Limitation of Study

1.8.1 Geographical scope

The present study will involve students of the center region of Cameroon precisely from some selected secondary bilingual and lay private schools of the Yaoundé VI municipality. Considering the fact that the secondary sector has an ideal population of learners of age group

1.8.2: Empirical and theoretical scope

This study shall be focus more on the planned behavioral theory by Icek Ajzen, the Triple bottom line theory by John Elkington, and the social learning theory by Albert Bandura.

1.9. Type of study

This is a descriptive correlational study. Correlational as it establishes a link or a correlation between two variables, that is between the independent variable (Environmental Education) and the dependent variable (Sustainable development); and descriptive because the IV and DV will be discussed. This study thus examines the various axes of sustainable development that correlate or predict the dependent variable (sustainable development).

The first chapter entitled problematic had has principal objective to present elements which help developed the research problem. In effect, we went through a series of observation, which reveal that the level of environmental pollution is high. Statistics present a disturbing situation, in the different dimensions of sustainable development. In spite the efforts of the state and its partners to encourage the protection of the environment in Cameroon we still observe undesirable attitudes with respect to the protection of the environment and life on land. From this observation result the problem of environmental risk resulting from individual attitudes towards the environment. This problem was analyzed using theories in management of education. This analysis permitted to bring out some factors which permit individuals protect life on land. At the end of these two observation, the research questions were asked. The research objective and significance ware also formulated. These different elements permitted us establish the base of our research work. The next section will present the different works on our research topic.

CHAPTER 2: LITERATURE REVIEW

This chapter focuses on the review of existing works on the variables of the study carried out by different authors and researchers. It will equally review some relevant information on the concept. This chapter is divided into two main parts: part one is the conceptual framework and part two will be the critical review of empirical studies. The critical review of concepts paid particular attention on what environmental education is, the role and importance of environmental education, environmental education the school curriculum, some variables of environmental education, sustainable development ,environmental education and sustainable intensions and the various arms of sustainability; in the critical review of empirical studies on the two main variables of this study.

2.1. Conceptual Framework

Conceptual literature is an essential part of any scientific work which permits the researcher to have an in-depth knowledge of the key concepts under study. In this light the literature on concepts such as environmental education and sustainable intensions and development shall be analyze.

2.1.1. Environmental Education

Education has been perceived as both an event and a process and it is one of the greatest human investment that can ensure and sustain the quick development of the economic, political, social and human resource of a country. In a initial point of view, education can be defined as the aggregate of all the processes by which a person develops abilities, attitudes, and other forms of behavior of practical values in the society in which he lives. It also sees it as a process of receiving or giving systematic instruction, especially at school. According to Gillies (2010), education is define as a process, planned or not, formal or informal by which humans develop in ways deemed to be socially acceptable, in terms of their knowledge, understanding, skills, attitudes and judgments. In this light good education is necessary for any society and is seen as a cornerstone of development, quoting Nelson Mandela, he defines education as “the most powerful weapon, which you can use to change the world”. In educational psychology, it is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. Risso & Tavino (2020) defines education as the process of developing skills, habits and attitudes. According to Dewey (1944), education is the development of all those capacities in the individual which will enable him to control his environment and fulfil his responsibilities.

Gagne (1985) stresses that for education to be objective, effective, and productive, it must involve a set of well-defined methods, tools, theories, principles, appropriate setting and even directed research. Education frequently takes place under the guidance of educators, but learners may also educate themselves (Merril et al., 1996). Thus, education can take place in formal, informal or non formal settings and any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational (Silber & Foshay, 2010). Education should be transformative and allow us to make informed decisions and take individual and collective action to change our societies and care for the planet. In environmental psychology this planet is referred to and the environment.

The Environment is the sum of total conditions in which an organism has to survive or maintain its life processes. The word environment is derived from a French word 'environia' which means to surround, the environment thus is the sum total of conditions which surround us at a given point of time and space. It comprises of the interacting systems of physical, biological and cultural elements which are interlinked both individually and collectively. Mukhopadhyay (2016) defines the environment as the total setting in which a given object rests or a given action takes place, including all physical, chemical, biological, physiological and psychological factors. Ross (CSIR Net 2022) defines the environment as an external force which influences us while Gisbert (CSIR Net 2022) defines it as anything immediately surrounding and object or individual and exerting a direct influence on it. Sauvé (1999) identifies six paradigmatic conceptions of the environment: the environment as nature to be appreciated, respected, preserved; environment as a resource to be managed; environment as a problem to be solved; environment as a "place to live", to know and learn about, to plan for, to take care of; environment as the biosphere in which we all live together, into the future; and the environment as a community project in which to get involved. The influence of these different conceptions can be observed in the pedagogical approaches and strategies suggested by different authors or adopted by educators.

Taking cognizance of the need of education and the influence of our environment in education, the Wiscons in environmental education board (WEEB) (1998) defines environmental education (EE) a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, ethical awareness and sensitivity for the relationship between humans and the environment, and commitment to engage in responsible individual and cooperative actions. Environmental education is a process that encourages the development of capacities to balance human activities in the environment (Farfan et al. 2021).

Environmental education process involves transforming everything related to caring for the planet in institutions such as schools or those who do their job. Borah (2007) defines environmental education as a learning process that increases people's knowledge and awareness about the environment and environmental challenges. Environmental education refers to organized efforts to teach how natural environments function, and particularly, how human beings can manage behavior and environment to live sustainably. It is a multi-disciplinary field integrating disciplines such as biology, chemistry, physics, ecology, earth science, atmospheric science, mathematics, and geography. The United Nations Educational, Scientific and Cultural Organization (UNESCO 2005) states that EE is vital in imparting an inherent respect for nature amongst society and in enhancing public environmental awareness.

2.1.2. Sustainable development

The term sustainable is derived from a latin word "sustinere" and this means to uphold, support or endure. Many studies attempted to research and define sustainability, Some were limited in their view of what the term means while others showed that the term can only be explained by looking at many interconnected aspects which together, define the meaning of sustainability. For instance, Business and Sustainable Development: A Global Guide (1992) stated that "sustainability for a business enterprise means adopting business strategies and activities that meet the needs of the enterprise and stakeholders today, while protecting, sustaining and enhancing the human and natural resources that will be needed in the future". Shrivastava (1995) on the other hand described sustainability as "offering the potential for reducing the long-term risks associated with resource depletion, fluctuations in energy costs, product liabilities, pollution and waste management". However, Sustainability consists of fulfilling the needs of current generations without compromising the needs of the future generations while ensuring a balance economic growth, environmental care and social wellbeing (UN 2005). Sustainability merely requires a standard of life within the limits imposed by nature.

According to Rist (2001), development is a constant evolution, based on the belief of human perfectibility and motivated by the incessant search for well-being. United Nations Development Program [UNDP] (1991, p. 77), on the other hand, suggests development as the expansion of the range of choices for the population that allows development to become more democratic and participative.

From an environmental perspective, the notion of sustainability "originates from theorizations and ecological practices that try to analyze the temporal evolution of natural resources, taking its persistence, maintenance or capacity of returning to a presumed state of balance after some type of disturbance as a basis" (Raynaut et al., 2000, p. 74).

The most familiar definition of SD is that of the Brundtland World Commission report (1987). They coined and defined sustainability as term was defined as "the development which meets the needs of the present without compromising the ability of future generations to meet their own needs". Understanding and achieving sustainability requires a shift to a meaning that is specific and can be quantified, in order to monitor the progress towards achieving the sustainability goals. Sustainable development, like any other conventional economic imperative, presupposes joining the maximization of economic production with social (minimizing current and future human suffering) and ecological (protecting the ecosphere) imperatives (Wackernagel & Rees, 1996).

A vision of development that encompasses population, animals and plant species, ecosystems, natural resources (water, air, energy) and that integrates concerns such as the fight against poverty, gender equality, human rights, education for all, health and human security (UNESCO, 2005). Everyone thus has the responsibility to act and educate themselves to ensure sustainable development. It is in this same perspective that Sachs (2004) makes some basic principles of this new developmental vision clear, and this includes: satisfying basic needs, solidarity with future generations, participation by the population involved, preservation of natural resources and the environment in general, preparation of a social system that guarantees employment, social security and respect for other cultures and education programs.

2.2. Review of empirical studies

This second part of chapter 2, permits us to do a review of works on out research topic. It thus requires presenting the different works on environmental education and sustainable development and research works on environmental education and sustainable development. The presentation of this work will be done in 3 section: one section on environmental education, another on sustainable development and the last on environmental education and sustainable development.

2.2.1. Environmental Education

2.2.1.1. History of Environmental Education

The history of environmental education reveals a close connection between changing concerns about the environment and its associated problems and the way in which environmental education

is defined and promoted. In the 1990s, mounting concern over environment and development problems has meant greater support for an educational approach, which not only considers immediate environmental improvement as an actual goal, but also addresses educating for 'sustainability' in the long term (Tilbury, 2006).

Efforts have been made to incorporate aspects EE in other disciplines but it isn't enough given the ongoing global environmental challenges. Mede(2018) in his work on 'incorporating EE in English language teaching says " Having critical thinking skills is an essential part of environmental education because if people do not criticize their thoughts and practices towards nature, they cannot be aware of their mistakes and take the necessary precautions to protect it".

The urgency and interdependency of environmental and societal issues lead many to believe that immediate actions are necessary to stem the tide of biodiversity loss, climate destabilization, resource overuse, and other concerns (Ehrlich, 2010; Orr, 2009; Steffen et al., 2011). Environmental education (EE) can engage people of all ages to make informed decisions about these and similar issues, and to undertake actions appropriate to their local context (NAAEE 1996; UNESCO, 1978). With application in urban and rural contexts, and drawing from natural and social science, EE is a multidisciplinary, interdisciplinary, and transdisciplinary fields (Krasny & Dillon, 2012; UNESCO, 1997).

In the past, EE research has focused on pathways to engagement with environmental issues through such areas as curriculum, which promotes the integration of EE into formal schooling (e.g. Bartosh et al., 2006; Lieberman & Hoody, 1998); character development, leadership, and other life skills, which may result from EE programming (e.g. Stern et al., 2014); significant life experiences leading to interest in environmental action and career choice (e.g. Chawla, 1998; 1999; Tanner 1998); variables associated with pro environmental action conservation behavior (e.g. Agyeman, 2002;
Hines, Hungerford & Tomera, 1987; Zelezny, 1999); and evaluation to address the effectiveness of EE initiatives in formal and informal settings (Ernst et al., 2009). These traditional questions find themselves enmeshed in new, some-times complicated, movements of politics, ecological change, theory, academic disciplines, and political economy (Krasny & Dillon, 2012; Stevenson & Dillon, 2010).

In many senses, the field is maturing to what Low and Altman (1992) described as the move from theory development to theory consolidation, from which we can derive lessons for practice. To build the capacity of the field and help unify what, at times, can seem to be divergent voices, EE

researchers and practitioners have become increasingly interested in considering where the field is situated in light of two days cultural, techno-logical, social, and political contexts (Strife, 2010). This reflexivity, critical to producing relevant scholarship, may also help prepare researchers to pursue agendas that inform emerging societal trends. To this end, numerous EE researchers have suggested potential agendas for research in EE and related fields (Fleishman et al., 2011). Summaries of EE research in the 1970s (Iozzi, 1981), 1980s (Marcinkowski & Mrazek ,1996), and 1990s (Hart & Nolan, 1999) provided insight into themes, set-tings, audiences, and methods of interest throughout the late twentieth century. The twenty-first century has also seen a number of efforts to articulate and focus research in EE. In 2005, Sauvé (1999) reviewed 30years of EE literature and identified cur-rents by which EE could intervene in the human relationship to the environment (Sauvé 2005). In describing the problem-solving current, Sauvé (2005) asks: "Must environmental education be fundamentally oriented towards problem-solving? Must environmental education necessarily engage learners in action projects aimed at solving a problem? Or is environmental education a preparatory phase for action? Considering the state of our world, would it be unethical to conduct environmental education without focusing on concrete problem-solving?" (p.16)

Scott (2008), the founding editor of Environmental Education Research, addressed the World Environmental Education Congress, reflecting on the 30 years since the world's first intergovernmental conference on EE (USSR, 1977; UNESCO, 1978). Scott (2008) suggested critical directions for EE research over the next 30 years. He argued that, we need greater openness to new cultures and more understanding across cultures, about who we are and what we know, and a stronger research focus on understanding the relationship between sustainability, society and learning as an environmental education community, we need to reach out to other researchers and users of research, and especially to policy makers because they need to know more about the significance of what environmental education researchers do, and because we need to work with them if we are to make a significant contribution to resolving the issues the planet faces (p. 155).

In 2006, Reid and Scott reflected on the first 10 years of Environmental Education Research through a specialized issue title "researching education and environment retrospect and prospect". They asked authors to recommend research foci and approaches for future work, and distilled the responses into a list, including an increased attention to ontology, epistemology, and theoretical approaches; dominant educational and environmental discourses; the relationship between EE, education for sustainable development (ESD), and other related fields; an interrogation and exploration of the relationship between theory and practice; and relationship between race, culture,

and power, and its influence on EE and EE research; among others (Reid & Scott, 2006). In 2010, the Journal of Environmental Education published a 40th anniversary edition focused on a prospective and retrospective of EE. Hungerford's epilog called for EE to focus on improving overall environmental quality and on the learner. He said that the tension between EE and ESD must be given continued attention, and that EE had matured substantially in the 40years of the journal. Hungerford (2010) emphasized that current efforts in the field are making strides towards actualizing the fundamental meaning and structure of this discipline, Sections of the forthcoming International Handbook of Research on Environ-mental Education, edited by Stevenson et al. (2013), also focus on the direction of a future EE research agenda. Stevenson emphasizes the need for research in understudied areas, such as worldviews and belief systems linked with individual identities; the contexts in which people live and work, people's emotional responses to education/learning and the environment; language and discourse; and social learning. Stevenson (2011) extends these areas to practice suggesting that researchers ask what meaning people construct related to environmental issues and encouraging researchers to think pedagogically from the student/learner perspective. This suggestion resonates with Rickinson et al. (2009) emphasis in their book, Environmental Learning: Insights from Research into the Student Experience, which presents case studies that emphasize learners' perspectives on environment and call increased attention to learner needs in designing and implementing EE efforts.

At the Tbilisi Intergovernmental Conference in 1977, the aim of environmental education was stated as helping learners develop "the ability to acquire, analyze, synthesize, communicate, apply and evaluate existing knowledge on the environment" (UNESCO, 1980). It was also emphasized that this should lead to an ability to actively participate in protecting the environment. Environmental education provides students with the knowledge, skills, and experiences essential to become successful community leaders, as well as making intelligent decisions pertaining to the management of their natural resources. In the past 25 years, research in environmental education (EE) has grown in output, scope, and types of design, as well as methods and approaches (Ardoin et al., 2013; Rickinson, 2001; Stevenson et al., 2013).

UNESCO's involvement in environmental awareness and education goes back to the very beginnings of the Organization, with the creation in 1948 of the IUCN (International Union for the Conservation of Nature, now the World Conservation Union), the first major NGO mandated to help preserve the natural environment. UNESCO was also closely involved in convening the UN International Conference on the Human Environment in Stockholm, Sweden in 1972, which led to the setting up of the United Nations Environment Program (UNEP). Subsequently, for two decades,

UNESCO and UNEP led the International Environmental Education Program (1975-1995), which set out a vision for, and gave practical guidance on how to mobilize education for environmental awareness. In 1976, UNESCO launched an environmental education newsletter 'Connect' as the official organ of the UNESCO-UNEP International Environmental Education Program (IEEP). It served as a clearinghouse to exchange information on Environmental Education (EE) in general and to promote the aims and activities of the IEEP in particular, as well as being a network for institutions and individuals interested and active in environment education until 2007

UNESCO emphasizes the role of EE in safeguarding future global developments of societal quality of life (QOL), through the protection of the environment, eradication of poverty, minimization of inequalities and insurance of sustainable development (UNESCO, 2005). The term often implies education within the school system, from primary to post-secondary. However, it sometimes includes all efforts to educate the public and other audiences, including print materials, websites, media campaigns, etc. There are also ways that environmental education is taught outside the traditional classroom. Aquariums, zoos, parks, and nature centers all have ways of teaching the public about the environment.

Environmental education engages learners as they understand how nature works and how humans impact our world. EE is hands-on, interdisciplinary, empowering, and relevant to learners' everyday lives. It gives them the knowledge and tools they need to be environmentally literate– ready to face environmental and social challenges with confidence and optimism. Meeting the objectives of EE requires long-term ongoing education, with 3 incremental targets: interest, understanding and action.

Figure 2.1

Targets of Environmental Education

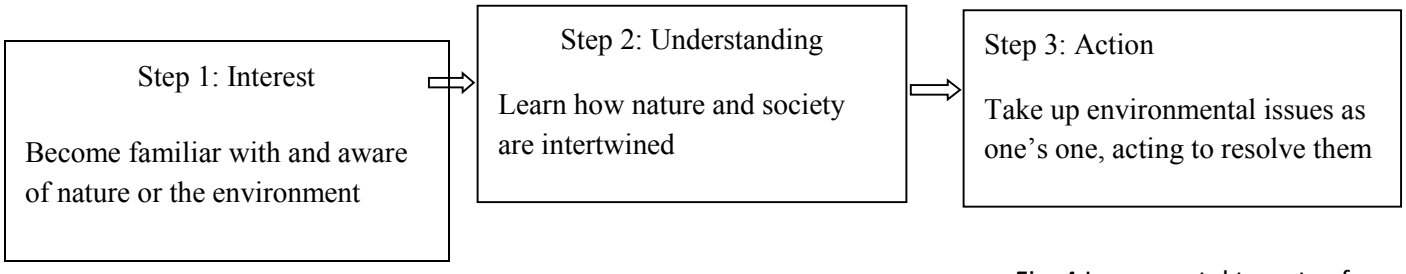


Fig. 4 Incremental targets of

Environmental education does not advocate a particular viewpoint or course of action. Rather, environmental education teaches individuals how to weigh various sides of an issue through critical thinking and it enhances their own problem-solving and decision-making skills.

2.2.2.2. EE and secondary School curricula

Etymologically, the curriculum comes from the Greek, 'carrier', which means the runners and 'curare', which means the race. Thus, the term curriculum is derived from the world of sports in the days of Ancient Rome in Greek, which implies a distance that must be taken by runners from the starting line to the finish line.

There are some definitions of the curriculum proposed by some experts. According to Taba (1962), curriculum is an instructional design drawn up by considering various things about the learning process and the development of the individual, while McNeil (1984) asserts that curriculum is a learning experience that is planned and directed, that is composed through the process of the systematic reconstruction of knowledge and experience under the supervision of educational institutions so that the learner can continue to have an interest in learning as part of their personal social competence. Wayne (2006) also confirms that curriculum is defined as all the planned learning spaces given to students by educational institutions and experiences possessed by students when the curriculum is implemented. Meanwhile, in Indonesia, with reference to Act No. 20 of 2003 Article 19, verse 1, the curriculum means a set of plans and settings about the objectives, contents and teaching materials, and methods used as guidelines for organizing learning activities to achieve certain educational goals. Thus, the curriculum can be interpreted as a document or a written plan which contains statements regarding the quality of education to be possessed of a learner. The quality of education here implies the quality of learning outcomes and the educational processes that must be owned and experienced by the learners. The curriculum is the focus of the development process because it describes the ideas of the decision makers that are used as a basis for curriculum development. The curriculum should thus be designed in such a way to prepare students and learners of all ages to find solutions for the challenges of today and the future, in order words the curriculum should be sustainable.

Chapter 36 of Agenda 21 focuses of UNESCO on "Promoting Education, Public Awareness and Training" with the key interest of improving basic education on EE, re-orientating existing education to address sustainable development, and developing public awareness, understanding and training. Re-orientating education is a powerful descriptor to help the state, administrators, educational planners, curriculum designers, inspectors at every level to understand the changes

required for ESD and the need of orientating school curriculum to incorporate EE. ESD encompasses a vision which integrates environment, economy and society, thus re-orientating education will be developing an education that involves learning knowledge, values, skills and perspectives which will guide and motivate people to live in a sustainable manner, to lead a sustainable livelihood and to participate in a democratic society.

Given the problem of environmental degradation and its impact which is very serious at an environmental level, scientific, educational, technological and political level, a historical analysis was carried out and it was found that, the environmental education was used as a tool (Farfan et al. (2021). Its motive was the construction of pedagogical alternatives with sustainability as a principle (Marquez Delgado et al. (2021) to see what happens in the day to day as nature is deteriorated.

Today it cannot be denied that environmental education is essential for society and a suitable place for its application would be schools. Through the experiences of the intervention, the scope of environmental education in schools is discussed (Castro S. & R. Núñez, 2020). This author's statement coincides with the majority of authors who investigate the subject of environmental education. Araya and Muñoz (2017) shows that the school is currently a privileged space for the generation and implementation of innovative educational practices that contribute to the protection of the environment. The central foundation holds that the development of an evaluative practice aimed at the formation of eco-consciences in the classroom allows for the advancement and consolidation of learning for life. In turn (Castro & Núñez, 2020) tell us in their results that there is a relationship between the curricular content and the socio-environmental scenario, as well as the identification of problems and solution proposals; being schools the ideal places to develop environmental education.

The results regarding the future and influence of environmental education according to (Ayaz et al. 2021) were that, there is a positive impact, that activity-based environmental education positively affects teachers both at cognitive, affective and behavioral levels. Similarly, Prosser-Bravo, SalazarSepúlveda, et al. (2020) tell us that there is a consensus on the advantages and benefits of implementing programs on environmental education in school communities, the problem is that there are few studies about the conditions for the implementation of a pedagogical innovation program to be incorporated as daily practices and education for sustainability. In turn, Yeşilyurt et al. (2020) in their research results, it is appreciated that the students who received environmental education, draw pictures enthusiastically and reflect an increase in environmental awareness, and in the interviews, the students developed awareness for caring for

the environment, empathizing with nature and drawing aesthetically highly appreciated images. Shimlina et al. (2018) also propose new strategies regarding what is environmental education in order to achieve sustainable development. According to (Andresen et al., 2020), their results show that they contribute to sustainable development goals and that community-based environmental education can condition people's awareness, improving the assimilation and / or understanding of new concepts.

The UN Decade of Sustainable Development (UNESCO, 2006) emphasis the need for EE for SD to be embedded in school curriculum in an interdisciplinary and holistic manner, allowing for a wholeinstitution approach to policy making. Environmental education is expected to change the behavior and patterns of public view towards positively associated with environmental issues and foster a love for the environment early on. Adisendjaja (1988) stipulates that, the purpose of environmental education can be elaborated into six groups, namely:

a. Awareness - gives encouragement to every individual to gain awareness and sensitivity to the environment and its problems.

b. Knowledge - helps each individual to obtain a wide range of experience and a basic understanding of the environment and its problems.

c. Attitude - helps each individual to obtain a set of values and the ability to get the right choice, as well as develop a sense of environmentally sensitive and provide motivation to participate actively in the improvement and environmental protection.

d. Skills - help individuals to obtain skills in identifying and solving environmental problems.

e. Participation - helps to motivate individuals to participate actively in solving environmental problems.

f. Evaluation - encourages every individual to have the ability to evaluate the environmental knowledge in terms of ecological, social, economic, political, and educational factors.

This is confirmed by Tyler (1990) saying that in the process of curriculum development and teaching there are some questions that need to be answered, which include the following questions: what are the purposes to achieve?, what experiences should be provided to achieve the goal?, how are the learning experiences organized effectively?, how to determine the successful achievement of the goals? Fien (1993) says, Environmental education should be a part of progressive child-centered

education, Environmental educators should be objective on matters of values, and the goal of environmental education is to create environmentally responsible behavior.

According to the Cameroon national education policy (2019), all fields of human endeavor, including arts, crafts, and sports, are valuable to both human and societal advancement, and so should be actively pursued by students in their curricula to achieve holistic development. This call for the need of EE and its effective application in the curriculum given it is valuable to human endeavor. It further stipulates that a holistic approach to education must come hand-in-hand with student empowerment and choice, and all subjects should carry importance within the curriculum. There is need to effectively incorporate environmental education in the curriculum and even make it a subject on its own, in order to generate a real impact on attitudes and habits of students. Seatter (2011) emphasizes that critical thinking plays a major role in preparing learners to take action for the protection of the environment. Student with a sound knowledge in EE will have the appropriate skills and values to be able to secure a sustainable livelihood, live sustainable lives and of course be employable. This can be well achieved with all well structured curriculum, trained EE pedagogues, well established pedagogic techniques to be employed by teachers and necessary didactic material

2.2.2.3. Modalities of Environmental Education

Environmental education can be divide into four modalities according Ardoìn et al. (2012) in her work on "an exploration of future trends in environmental education": education on waste management, education on gardening effects, education green partnership and education on green pedagogic actions. These indicators are also affirmed in the UN 2020 report on environmental performance index.

2.2.2.3.1. EE on waste management and recycling

Materials or goods basically become "waste" when they are no longer needed by their owners. Waste management is a process of arranging human resources, materials, and financial capital to ensure that each stage is handled properly in order to achieve the overall waste management objectives. Man's production and consumption pattern has created a lot of environmental waste and resources depletion in most part of the world, how these waste and resource depletion can be managed or remedied has become a major source of concern to most environmental scientist and other stakeholders in the environmental business (Eneji et al. 2019). When analyzing waste issues, the first step is to confirm what problems are occurring in what phase of the waste flows. Waste management or disposal is an immediate and critical issue for the community now and ineffective

or irresponsible disposal of solid waste pollutes the environment and pose risk to public health (Asmawati et al. 2010). Reducing and eliminating environmental pollution is an important objective of waste management. Dri et al. (2018) mentioned that the way communities generate and manage waste plays an absolute key role in their ability to use resources efficiently, and a huge opportunity for saving resources lies in improving waste management at local levels. The UN 2020 report on environmental performance index prescribe ecosystem service, biodiversity and habitat, waste management and climate change among others as indicator of environmental management.

Nowadays, the evolution of consumption patterns linked to a contemporary lifestyle has an even greater impact on the production of waste and its management in cities (De Chacus & Whannou, 2017). Indeed, the consumer society appeared with new manufactured products, thus producing new waste (Kaboré, 2009). This change can be observed everywhere and especially in the cities of Cameroon where the plastic bag has become the main means of packaging. For more than a decade, the abusive use of plastic bags has been recognized as a danger or even a scourge for the population and the environment (Mehu, 2003).

Majority of the watse are plastic waste according to the Ministry of the Environment and Nature Protection (Saïfoullah et al., 2020). A study conducted by Ngambi in 2015 shows that the production of plastic bags between 2005 and 2012 is on the rise. Indeed, we went from 350 kg of waste per day in 2005 to 1028.23 kg per day in 2012 (Ngambi, 2015). A study conducted at the Mérina Hotel in Yaoundé showed that the quantity of waste produced over three days was estimated at 239.80 Kg and 5.27 kg would be produced each by one occupant of the hotel. Among all the waste produced by the hotel, plastic waste ranks first with 7.82 kg, including 6.22 kg from catering and 1.6 from accommodation (Foyet Ngakam & Tchawa, 2018).

The African Union contributed to the management of plastic waste by commissioning a study in 2010. The results revealed that in terms of solid waste, the large production comes from urban centers and is concentrated in the economic capital Douala. The specific production is 0.54 kg and 0.59 kg between 1995 and 1997. Thus, the quantity of waste produced per day is around 413.12 to 442.52 tonnes, i.e. 161,512 tonnes produced per year. In 2010, it increased to more than 1 million tons per year. Nationally, 6.95% of the waste produced is plastic (Action Carbone Solidaire, 2014).

The statistics have revealed a worrying situation in terms of the national framework and the quantity of waste produced. This ever-increasing use leads us to take an interest in the causes of this phenomenon and the consequences that may result from it.

In African countries, especially in Cameroon, it is common to see rubbish littering the streets and open lots, as well as rubbish spilling out from already full waste collection containers. Rubbish tossed in the rivers and gutters clogs the drainage channels and causes flooding. Such a state can lead to further illegal dumping and make the community less safe. The food waste comprising the bulk of waste in Africa attracts insects and pests. In regions with high temperatures, waste tends to promote the breeding of flies and gastrointestinal pathogens that can cause the spread of diseases such as gastroenteritis, hepatitis, and cholera. In addition, accumulated water in plastic bottles and waste can attract mosquitoes, propagating malaria, dengue fever, and yellow fever.

A majority of the waste collected, is not being properly disposed. At least 70% of waste is disposed of in open dump sites in Sub-Saharan Africa. In addition to pests, open dump sites invite a host of other issues, including offensive odors, fires, the contamination of surface and ground water from leachate, and associated soil contamination. These sites also generate and release methane, a greenhouse gas which contributes to climate change. Worse still, there have been many accidents in recent years with many human casualties resulting from collapse of waste piles in open dump sites. Large landfills without pollution control measures, surface compaction and soil covering. There have been frequent accidents with waste mound collapses, including Addis Ababa, Ethiopia (March 2017) and Maputo, Mozambique (February 2018).

In Africa, lifestyle changes brought about by economic growth are pushing up the amount of waste requiring special treatment for disposal such as plastics, electronic products, and tires. Additionally, large volumes of used electrical and electronic products are imported from developed countries to Africa for reuse, many of which no longer work and become E-waste (Electronic waste). Without the adequate techniques and legal system in place for the proper disposal of waste in African nations, lead and dioxins will damage worker health, and the environment will be polluted. In order to improve unsanitary urban conditions, the waste must be collected and removed from living habitats, as well as strict implementation of laws against illegal dumping of waste and waste littering.

Waste recycling being an aspect of waste management entails reclaiming of materials from a product that has been worn out or rendered obsolete. Recycling can help reduce the quantities of solid waste deposited in landfills. Recycling also reduces the pollution of air, water and land resulting from waste disposal. Recycling waste also goes a long way to conserve natural resources such as timber, water and minerals, protect ecosystem and wildlife, saves energy as well as reduce the need to harvest new materials.

The New York Recycling Champions Program, the New Voices Green Team hosted a recycling and compost assembly program as part of their 1st organics collection and recycling program in the cafeteria. A group of 537 students created 2 small bags of trash in which they collected waste during a lunch; which was recycled and composted. Holding school classes on waste issues and waste separation and recycling may indeed raise children's interest in waste issues. The teaching of the 3R concept to learners will also permit them have the appropriate notions to waste management and protection of the environment for sustainability.

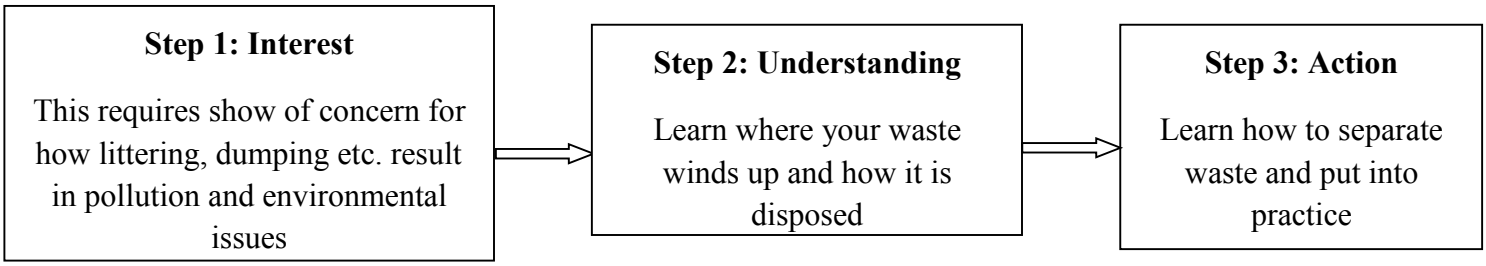
- **Reduce** : using things with care and reducing waste such as, only buy or receive necessary things and goods, bring your own bag for shopping.

-**Reuse**: using things repeatedly such as choose products that can be refilled, give away things that you no longer need.

-**Recycle**: reusing waste as resources such as sort waste properly so that recycling activities go smoothly, use products created from recycled waste.

Classes alone are not likely to get children to put their learning into practice but the association of effective hands on activities (UNESCO, 2001). According to this author, the following event and activity examples can be effective in bridging the gap between interest and behavior, providing an opportunity for lessons to be put into action: Environmental art contest, Zero waste parade, Environmentally themed display boards or wall posters, Rubbish pick up eco-relay, Recycled crafts contest using school rubbish, Eco-school competition, Waste-based skit contest, Survey of school waste (locations, types, volume), making flower beds out of waste types and growing a garden and Environmental awareness art/murals on school grounds walls. The figure below provides an overview of a systematic approach to effective waste management.

Figure 2.2 Steps for waste issues



2.2.2.3. 2. EE and gardening

Encyclopedia Britannica defines gardening as, “the laying out and care of a plot of ground devoted partially or wholly to the growing of plants such as flowers, herbs, or vegetables. Gardening is a part of horticulture and gardens represent the natural environment. It involves the growing of plants such as shrubs, flowers, vegetables, fruits and trees which in turn help the environment by taking in carbon and releasing oxygen. Relf (1992) defines it as ‘‘the art and science of growing flowers, fruits, vegetables, trees, and shrubs, resulting in the development of the minds and emotions of individuals, the enrichment and health of communities, and the integration of the garden in the breadth of modern civilization’’.

The Cameroon national policy on education mentions the teaching of gardening in school curriculum. One method of integrating environmental education into the classroom is through an activity-based curriculum including hands-on experiences. It has been reported that students tend to learn better when they are actively involved and hands-on activities help to improve their acquisition of new knowledge, skills, and attitudes. Activities help students apply the information they receive rather than just memorize it. Horticulture, because it is an activity-based, hands-on discipline, may aid in the incorporation of environmental education into existing curricula. Past research also indicates that children who participate in numerous outdoor activities have more positive environ-mental attitudes compared to children with fewer outdoor activities. Gardening is definitely an outdoor activity, and may play a role in improving the environmental attitudes of children.

Research has found that youth involvement in school gardens leads to numerous benefits, such as improved academic student achievement, development, health, environmental attitudes, and knowledge of food systems (Berenguer, 2007; Dirks & Orvis, 2005; Graham et al., 2004; Morris et al., 2000; Rahm, 2002; Skelly & Zajicek, 1998; Waliczek & Zajicek, 1999; Williams & Dixon, 2013). For these reasons, school gardens are increasingly popular nationally and internationally as learning spaces.

Schools provide an opportunity to capitalize on integrative, place-based, botanical education by modifying their green spaces (Sobel, 2005; Waliczek & Zajicek, 1999) to improve plant yield, as well as learners personal wellbeing and a sense of empowerment. Teachers can use the school's surroundings as a framework where students build their own learning and improve local environmental quality (Lieberman & Hoody, 1998; Sobel, 2005; Tatarchuk & Eick, 2011). These gardening activities. Ardoìn et al. (2012) in her work on “an exploration of future trends in

environmental education" report gardening as an indicator of Environmental education. Their research results revealed that a good number of interviewees highlighted the potential of community gardens, farmers markets, and other forms of urban agriculture to serve as everyday life contexts and sites for bringing together social and ecological learning across diverse communities.

Ardoìn et al. (2012), a community garden provides a place for children to learn about connections between food and the environment, but it may also serve as a place for job training in horticulture or a site where elderly people or master gardeners tend community allotments and share their knowledge with local kids. In some cases, local restaurants use these gardens to grow local vegetables or exotic spices. They may cook a meal with the children for the community, using the ingredients they have grown together. For community developers engaged with social justice issues, the garden may be a site for empowerment of youth or under-served communities. The result is that a school, a senior center, a restaurant, a non-profit organization, a parents and tots group, may all be working independently on the common goal of converting school grounds into community gardens. Teachers and environmental educators need different kinds of competencies to guide such projects, to learn how to bring these groups together, and to facilitate the kinds of multi-generational, trans-disciplinary learning that such opportunities generate, while still connecting it to the curriculum of their students. They need to know who in society can become a part of their learning configuration and how to access them.

Hands-on activities seem to be especially effective at improving attitudes toward plants and plant conservation, and may help reinforce concepts learned, even after the experience is over (Fančovičová & Prokop, 2011). Participating in a plant-centric educational program may also improve attitudes toward studying biological and conservation concepts in a classroom setting (Fančovičová & Prokop, 2011; Waliczek & Zajicek, 1999). Participants felt more strongly after participating in this activity that they can influence how local to global environmental problems are solved and can help control the decline of pollinators locally by adding native plants to the environment.

In particular, hands-on activities require the active participation of students through the manipulation of educational materials and elements (Flick, 1993); while in PJBL students build knowledge through teamwork and problem solving (Krajcik et al., 1999; Thomas, 2000). Some examples of educational projects, based on hands-on learning and PJBL models, have demonstrated effectiveness gaining more positive attitudes towards environmental issues, strengthening ties and improving the ability to teamwork, ultimately translating into more significant learning for both

teachers and students in the areas of science, technology and mathematics, among others (Hofstein & Lunetta, 2004; Vannatta et al., 2001; Waliczek & Zajicek, 1999).

Similarly, the capacity to raise butterflies at schools can make inconspicuous invertebrate species salient and facilitate potential action to protect them. Teachable moments and garden failures eventually transform to garden success if teachers scaffold their students to work through adversity and "fail forward" (Lieberman & Hoody, 1998; Bradley et al., 1999)

Many studies (Kos & Jerman, 2019; Bradley et al., 1999) have also confirmed that school gardens can positively affect student's attitude and knowledge. Similarly, Leuven et al. (2018) showed that although, school garden may influence students in the short run as an educational intervention, any meaningful change needed a long-term process (Taylor et al., 2017). Another author (Rodr**o**guezHern**á**ndezet et al., 2021) shows us how the school garden has been used as a didactic strategy based on the school research model and its results show that this resource helps in teaching the environmental part. Similarly, Chipantiza-Masabanda et al. (2021), proposes as a strategy a program based on horizontal-vertical urban and peri-urban gardens to promote sustainable environmental education, its results show bilateral significance for the experimental group, therefore, the applied treatment is effective in the population sample. Pérez et al. (2019) adds that collaborative learning is required and should be promoted for the application of environmental education.

Report from Project GREEN (Garden Resources for Environmental Education Now), a school garden program, was integrated into the curriculum of seven elementary and junior high schools in Kansas and Texas. The objective of the study was to evaluate whether students participating in garden activities were gaining more positive attitudes about environmental issues. Students' environmental attitudes were significantly more positive after participating in the school garden program with posttest mean scores 0.26 points higher than the pre-test mean scores. Other studies have demonstrated the importance of school gardens as effective teaching tools inside and outside of classrooms (Klemmer et al., 2005; Libman, 2007; Sobel, 2005). The hands-on, active-learning approach connects students with the environment as they learn about their surroundings (Pyle, 2002; Waliczek & Zajicek, 1999). For example, edible gardens can change students' attitudes toward foods, particularly unpopular vegetables (Libman, 2007).

Gardening also goes a long way to address many health threats, improve well-being, provides physical activities, improve nutrition and reduces stress (Lovell et al., 2014). Lovell goes further to say the gardening improves wellbeing through improved social contact, cultural valued activities

and mitigation of food poverty. WebMED say that gardening activities has great benefits on improving Mental health, improves peoples moods, boost self esteem, improves attention span, encourages social bonds as well as provides exercise thereby reducing anxiety and depression.

Article 5 of the Cameroon 1996 law on environmental management stipulate the right of a sound environment and harmonious balance of within ecosystems and between the urban and rural zones while the Article 1 of the 1994 law on forestry, wildlife and fisheries regulations promote the growing of gardens and forestry activities to ensure sustainable conservation and use of the said resources for the wellbeing of man. The Cameroon national policy on education mentions the teaching of gardening in school curriculum and implemented the green school policy for secondary schools. Integrating activity-based curriculum into the classroom is through hands-on experiences such as horticulture may aid in the incorporation of environmental education into existing curricula. It has been reported that students tend to learn better when they are actively involved and hands-on activities help to improve their acquisition of new knowledge, skills, and attitudes. Activities like Horticulture (because it is an activity-based, hands-on discipline) help students apply the information they receive rather than just memorize it. Past research also indicates that children who participate in numerous outdoor activities have more positive environmental attitudes compared to children with fewer outdoor activities. Gardening is definitely an outdoor activity, and may play a role in improving the environmental attitudes of children.

2.2.2.3.3. EE on green partnership

Partnership is the relationship between two or more parties contractually associated as joint principals with mutual benefits. These parties could individuals, businesses, interest based organizations, schools governments or combinations. Mohiddin (1998) refers to partnership as the 'highest stage of working relationship between different people brought together by commitment to common objectives, bonded by long experience of working together, and sustained by subscription to common visions. From an educational perspective, partnership is seen as a form of unification, support and assistance for formal education influences to ensure quality education. Collaboration between school, family and community requires effective communication, a unit of requirements and actions in the child's interest, but each one of those institutions shall retain their identity, bringing only the contribution in a specific and concrete way by cultural, social and economic doings. According to Cristea (1998), pedagogical partnership meets two functions that are in complementary relationship: opening function of schools to institutions located outside the education system, which tent to integrate in this system, and exerted synergistic function both within the educational system and outside it. From this point of view, the specific objectives of

educational partnership would cover cooperation activity between all education stakeholders to form student's personality.

In the last twenty years, the concept of 'partnership' has emerged as the 'new big idea' in development discourses. The term 'partnership' in relation to development came to particular prominence in the Organisation for Economic Co-operation and Development (OECD) 1996 report, *Shaping the 21st Century: The Contribution of Development Co-operation.* This argued that aid should focus on a limited list of poverty reduction and human development goals, a list which was later published as the MDGs. The development of a 'global partnership for development' is the pledge of the eighth MDG. The development partnership approach was further endorsed by the *Paris Declaration on Aid Effectiveness* (2005) and the *Accra Agenda for Action* (2008). Development cooperation has been largely carried out by government agencies and non-governmental organizations (NGOs) for some time now.

Education on partnership involves the formation of a learning unit or units between students or for students to purposefully assist them acquire skills, knowledge and attributes necessary to attain one's learning goals. Partnerships and networks should be established and supported as an important strategy for developing and practicing skills. This could be by NGOs, Clubs and programs at the local, national, regional and international level. Collaboration among the many actors involved in education across the world will help to ensure that the system embraces EE that requires the distribution of power across institutions in order to facilitate educational change.

Ardoìn et al. (2012) also highlights the role of partnership like NGO in EE, by recommending the need of *involving wider members of the community in a continued community-based environmental education, alongside further consideration of the role of NGOs, informal learning spaces, farmers and agro-businesses in raising environmental awareness and supporting practices and behaviours to combat environmental degradation. (Waktola2009, 603).* Calderon-Madero et al. (2019) results mentions that there is a lack of knowledge in educational institutions about School Environmental Projects-PRAE in the educational policies in Columbia, throughout the institutions and above all little administrative support for the implementation of this, therefore, activities related to environmental issues lag behind natural science knowledge areas.

Environmental NGOs can play a crucial role in helping to plug gaps by conducting research to facilitate policy development, building institutional capacity and facilitating independent dialogues with civil society to help people live more sustainable lifestyles. Green Cameroon is an environmental protection and conservation NGO in Cameroon with objective to preserve, maintain

and sustain the environment. Green Cameroon has as mission to ensure sustainable development and a better planet for our children by addressing major environmental and sustainable development issues identified in communities. Schools and educational intuitions need to establish environmental and sustainable development clubs in their respective or indulge in corresponding exchange programs in order to join global and national efforts to protect the environment, achieve sustainability and protect life on land.

The Environment and Rural Development Foundation (ERuDeF) is another NGO in Cameroon with a vision to save rainforest, conserve species and impact lives. They also promote environmental education as well as empower rural communities through innovative economic and livelihood development programs. The ICENECDEV is another platform that functions within the framework of the Cameroon Development Agenda 2035, the African Union 2063 and the Agenda 2030 for the SDGs specifically the SDG 17 talks of partnership; to strengthen the means of implementation and revitalize the global partnership for sustainable development. ICENECDEV connects international development partnerships with technical and financial support to its partners and collaborators in Cameroon, Africa and other regions of the world.

Exchange programs such as the World Federation of UNESCO Clubs, Centers and Associations (WFUCA), which places great emphasis on the global perspective of ESD where our actions are connected to the world at a local, national and international level. This will provide young people with the opportunity to create links with young people in a developing country through the UNESCO club network. Another element of the program is the development of an ESD newsletter and webpage (http://www.ecounesco.ie/youth_sustainable.aspx). The program covers many of the elements of ESD where global and local dimensions are addressed. Consultation with young people prior to delivery enables us to feed their views into the program content. The program also works with some 'at-risk' youth groups and therefore aims to ensure its relevance to those in more marginalized communities.

Programs like **Youth for Sustainable Development, Climate Smart Agriculture Youth Network** are good examples of education for sustainable development. They address the needs of the target group and provide them with an opportunity to feed into the program development. The methods used in the programs are transferable to any ESD program including schools' initiatives and community development work. Moreover, the development of practical skills such as teamwork, communication skills and critical thinking is also encouraged. The local to global dimension is also

important to any ESD project to promote understanding that local actions can have global consequences.

UNESCO also has other sustainable programs like the Global schools Advocate, Eco-Schools, Green Schools, Teaching for Change, Social Change Schools, Coalition 2030 and UNESCO School project Network which all aim at supporting education systems around the world in shaping a more resilient and sustainable world. The aim at creating a world where every primary and secondary school student will be equipped with the knowledge, skills and values necessary for effectively responding to the greatest challenge of the 21st century and lead healthy and productive lives in harmony with nature. The Geneva 2030 Ecosystem is a multi-stakeholder initiative that mobilizes the capacity, skills, experience, ideas and motivation of Geneva-based actors towards realizing the 2030 Agenda.

Partnerships are necessary to obtain high educational achievement for all students regardless of gender, socioeconomic status, family makeup, or ethnic group. Berliner and Biddle (1995) claim that schools could potentially overcome the effects of poverty and inequities among students by developing connections to community, their teachers, and their peers. Partnership also helps in the supply of some important and necessary resources to schools.

2.2.2.3.4. EE on green pedagogic actions

Pedagogy is a method of teaching both as an academic or theoretical concept. Green pedagogy is a learning activity, which is learner oriented and require acquiring communicative competencies through interdisciplinary by testing options and decisions for sustainable actions in as many situated learning processes as possible. Green pedagogy approach achieves sustainability competencies through a controlled appeal to the emotions and explicit uncovering of learner values to take on new ideas and new perspectives in more sustainable directions. Green pedagogy was developed at UCAEP in Vienna since 2010 as a way to promote strong sustainability mindset in learners. It aims to go beyond knowledge and skills and to target long term attitudes or mindsets. By targeting attitudes, deep learning about sustainability, based on more conscious understanding of how actions support or negate existing values is achieved.

Education for Sustainable Development (ESD) is about including key sustainable development issues into the teaching and learning process (climate change, disaster risk reduction, poverty reduction etc.)

It requires participatory teaching and learning methods that motivate, empower learners to change their behavior and take action for sustainable development. ESD consequently promotes

competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way. In such doing, it promotes quality education and deeply reorients teacher's curricula.

Ardoin et al. (2012) also recommend the role of environmental programs and activities to raise environmental awareness and achieve sustainability. Green pedagogic actions include lessons and practical activities to raise learners' awareness. Planning and delivery lessons must focus on 6 steps: confronting learners to identify existing problems, reconstructing misconceptions, provoking learners to suggest solutions, providing scenes of interaction between learners to permit collaborative analytical discussions, prompt learners to relate what they have learnt to their personal experience (deconstruction) and permit learners to create a vision of where their ideas or actions could lead (reflection).

Flórez-Yepes et al. (2018) report that, the best way to learn is by doing and it would also apply to environmental education issues. Environmental education is learnt by doing (Flórez-Yepes et al., 2018), the result shows that the best tool for learning environmental education in childhood would be to implement it from the development of practical exercises that allow them to know through environmental problems in real cases and thus be able to prevent, mitigate and control them. In turn (Hawa et al., 2021) as a result, the learning model and the most used method was outdoor learning with a contextual method.

Colombia adopted the National Policy for Environmental Education that guides the implementation of School Environmental Projects-PRAE. A simile was made between the guidelines of the environmental education policy and the existing state in educational institutions in relation to environmental education through the use of the tool: "applied workshops" and in the results found, a lack of knowledge was evidenced in the teachers of educational institutions on the lines of work of the PRAE, as well as obstacles in the dissemination of the PRAE in the institution and the minimum support for the respective implementation. Coming to visualize that activities related to environmental education are lagging with respect to the knowledge of natural sciences, and are not consistent with the PRAE (Calderon-Madero et al., 2019). Environmental education can also be disseminated with training workshops for its better dissemination (Farfan et al., 2021).

On the other hand, one way to optimize environmental education would be for it to be applied in games to increase knowledge of the native species that inhabit a given country. For example, the student body was asked to list all the animals they know from their country, being able to consider an acceptable result for the interventions of environmental education in relation to the

knowledge of the biodiversity and identification of species. The game used as a strategy in environmental education should not be discarded but used. The author (Díaz & Prada, 2019) in his results shows that play is an environmental education tool for the transformation of consciousness to benefit the conservation of the environment and recommends finding pedagogical alternatives to promote environmental education since, for sustainable development, quality of life and care for the environment would be a very useful instrument.

Rivera et al. (2016) have it that, there is a cause-effect relationship between interdisciplinary teaching and environmental education. Pérez et al. (2019) propounds that, collaborative learning is essential in environmental education.

Due to the fact that citizens with environmental awareness must be trained, it is necessary to implement very effective methodologies. The methodology that seeks the participation of the students generates a continuous improvement in the process and from the identification of the environmental conditions, allows to establish the guidelines to generate an Environmental Education Program (Díaz & Prada, 2019) to achieve positive results in caring for the environment, environmental education programs must be generated.

Nkwetisama (2011) states that in as much as aspects of EE feature in the English language curriculum in Cameroon, teachers find it challenging to bring out knowledge of EE in their lessons. Nkwetisama still in his work on EFL/ESL and Environmental Education: Towards an Eco-Applied Linguistic Awareness in Cameroon proposes that "teaching should not only be limited to the improvement of learners' language proficiency but also to enable them develop critical thinking strategies that can be useful in environmental sustainability".

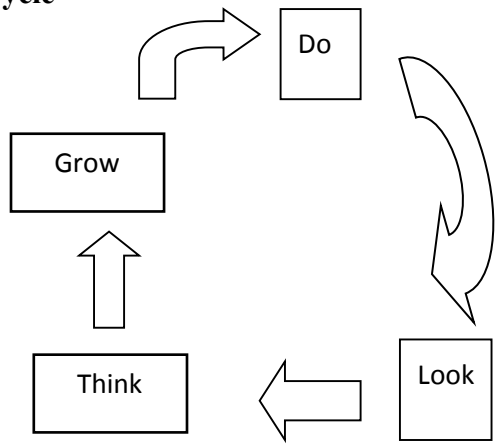
In turn, the study of Bezeljak et al. (2020) present that, participants present a good knowledge of environmental education; however, they lack understanding of the interconnections between the environmental part, economic and social dimensions related to sustainable development. For proper implementation of EE, Rushton (2021) in his findings mentions that teachers are based on a variety of approaches to implement environmental and sustainable education, thus valuing their own stories and those of their students, developing personal connections with the environment; teachers always seek to empower young people to make changes in their lives and communities

The proverb that proves the importance of hands-on learning is the words "I hear and I forget. I see and I remember. I do and I understand." Rather than just listening to the lessons, seeing and

experiencing remains in the memory and leads to a deep understanding. This supports the need of practical lessons or hands on activities in the teaching learning process.

Hands-on learning generally proceeds through a loop of four steps: 1) do, 2) look, 3) think, and 4) grow. From here, the process transitions to the next experience. More specifically, in the learning cycle, students first 1) experience something (do), then 2) observe others experiencing, mutually sharing their experiences and insights (look), then 3) analyze the causes for the experience and the circumstances leading to these causes (think), then 4) confirm the experience itself and details gained from analyzing the experience, and hypothesize what to do next (grow).

Figure 2.3 Hands-on learning Cycle



The adoption of other appropriate teaching approaches to ensure the effective teaching of EE for SD is worthwhile. Teaching pedagogies like the system thinking competency approach to permit students interact with each other and also know how educational, social economy and environmental units interact for a stable planet; the anticipatory competency approach where students can picture the world with different consequences of diverse actions and come out with suitable sustainable solutions; the normative competency approach which permits students reflect on their norms and values; the strategic competency approach which orientates students to think strategically about the world and take transformative actions and the collaborative competency approach where students acquire the aptitudes to be able to understand the needs of others and the society and provide suitable sustainable solutions.

2.2.3. Importance of environmental education

There is mounting evidence on the widespread benefits of environmental education, including positive impacts on academic performance, motivation and interest in school, social and emotional skills, and civic interest and engagement.

Environmental education helps us to understand the world around us. This understanding can be facilitated through work in virtually any subject area, including science, math, technology, literacy, history, civics, language, physical education, music, art, and more. Good environmental education helps students see the connections between disciplines and apply knowledge in flexible, adaptive ways. Environmental education allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

A good number of authors agree on the importance of environmental education. Caride and Meira, (2019), propounds that an ethical urgency must be assumed in which we do not have time to go back with commitments to life and its diversity and explains that without environmental education it will be very difficult to generate an ecological transition, locally and globally, in the short term and in the long term, allowing the articulation of the education-society-environment dialogue. In turn (Gough, 2021) in the context of global changes such as the emergence of the COVID-19 pandemic, argues that it is important that the Australian education agenda assumes a responsibility that includes a significant commitment to climate change and Related topics through ecological education in the country with a reinvented school science curriculum.

The application of traditional knowledge and scientific knowledge in educational work such as in the process of teaching biology; it is seen that, medicinal plants contribute to the learning of the natural environment. Some of this local knowledge was investigated and, later, they were transferred to the classroom and contrasted with botanical textbooks. Obtaining as a result that students share a significant practical knowledge of their traditions, and that, due to the globalization process, they present risks of disappearance (Vinholi & De Azevedo, 2020). It can be deduced that prior knowledge is important and can be used in environmental education. In a school whose students have a very deep popular knowledge; when discussing the specific biological science for the study of vegetables - botany, there was interesting learning (Farfan et al., 2021).

Environmental education positively influences teachers in training in cognitive, affective and behavioral terms (Ayaz et al. 2021). In a study to examine the effects of activity-based teaching for the development of environmental identity, Environmental education was found to positively influence teachers in cognitive, affective and behavioral terms (Farfan et al., 2021). The teachers who participated stated that they enjoyed the lessons more, in addition that their environmental awareness increased and that they applied a variety of environmentally-friendly

behaviors in their daily lives. Based on this, it can be concluded that environmental education should be used to improve environmental identity.

In a study to improve environmental awareness in students who attended a state elementary school, results reveal that, students who participated in environmental education, make drawings reflecting environmental awareness, acquired awareness of the environment, empathizing with nature (Yeşilyurt et al., 2020). It follows that by applying programs on environmental education it would be a strategy to sensitize students in the care and protection of the environment, as such environmental education generates improvement in environmental awareness

An experience carried out in a classroom, in which a school garden was used as a didactic proposal according to the school research model, being able to visualize that this resource favors environmental literacy, and at the same time it can be used to articulate didactic proposals that promote the resilience of the population (Farfan et al. 2021). So early childhood education would seem to be the right time to take advantage of the innate ability of children to explore and get to know the world around them and bring them closer to their natural environment, it is therefore the perfect time to start connecting them with nature. It would be desirable to bet on a quality environmental education, which puts at the hand of the smallest resources and strategies to explore their environment, thus achieving learning experiences that strengthen the union with nature (Rodríguez et al., 2021). Environmental education allows to strengthen that link with nature that would achieve a benefit in the short, medium and long term.

Matějček et al. (2020), carried out a research on environmental education as a transversal subject to attain sustainability primary schools (students from 6 to 15 years old) in the Czech Republic. Research results shows that environmental education is implemented across most subjects, but its effectiveness varies considerably from one school to another (Matějček et al., 2020). It usually happens in many schools, as it is a transversal subject, but they do not give it due importance. In effect, it is seen that the importance of environmental education is recognized but there is no real support to apply it effectively. However, environmental education in many tropical countries is rarely incorporated into public school curricula and wildlife issues are often underrepresented.

The role of education can thus positively influence the management of the world's increasingly stressed natural resources through the incorporation of successful techniques of environmental education. Education is thus an essential tool in achieving sustainable intensions worldwide.

Addressing environmental issues is a government, corporate, community responsibility as well as individual responsibility.

2.3. Sustainable development

2.3.1 History of sustainable development

The concept of sustainable development has its origins in the 1980 World Conservation Strategy. The initial meaning of the concept can be seen in the way that Strategy was drafted. The concept of sustainable development emerged as a response to a growing concern about human society's impact on the natural environment. Sustainable development was defined in 1987 by the Brundtland Commission (formally the World Commission on Environment and Development) as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland, 1987). This definition acknowledges that while development may be necessary to meet human needs and improve the quality of life, it must happen without depleting the capacity of the natural environment to meet present and future needs.

In June 1992, at the Earth Summit in Rio de Janeiro, Brazil, more than 178 countries adopted Agenda 21, a comprehensive plan of action to build a global partnership for sustainable development to improve human lives and protect the environment.

Member States unanimously adopted the Millennium Declaration at the Millennium Summit in September 2000 at UN Headquarters in New York. The Summit led to the elaboration of eight Millennium Development Goals (MDGs) to reduce extreme poverty by 2015.

The Johannesburg Declaration on Sustainable Development and the Plan of Implementation, adopted at the World Summit on Sustainable Development in South Africa in 2002, reaffirmed the global community's commitments to poverty eradication and the environment, and built on Agenda 21 and the Millennium Declaration by including more emphasis on multilateral partnerships.

At the United Nations Conference on Sustainable Development (Rio+20) in Rio de Janeiro, Brazil, in June 2012, Member States adopted the outcome document "The Future We Want" in which they decided, inter alia, to launch a process to develop a set of SDGs to build upon the MDGs and to establish the UN High-level Political Forum on Sustainable Development. The Rio +20 outcome also contained other measures for implementing sustainable development, including mandates for future programmes of work in development financing, small island developing states and more.

In 2013, the General Assembly set up a 30-member Open Working Group to develop a proposal on the SDGs. In January 2015, the General Assembly began the negotiation process on the post-2015 development agenda. The process culminated in the subsequent adoption of the 2030 Agenda for Sustainable Development, with 17 SDGs at its core, at the UN Sustainable Development Summit in September 2015.

2015 was a landmark year for multilateralism and international policy shaping, with the adoption of several major agreements: Sendai Framework for Disaster Risk Reduction (March 2015); Addis Ababa Action Agenda on Financing for Development (July 2015); Transforming our world: the 2030 Agenda for Sustainable Development with its 17 SDGs was adopted at the UN Sustainable Development Summit in New York in September 2015.

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests. The SDGs build on decades of work by countries and the UN, including the UN Department of Economic and Social Affairs.

The sustainable development movement has grown and campaigned on the basis that sustainability protects both the interests of future generations and the earth's capacity to regenerate. At first it emphasized the environment in development policies but, since 2002, has evolved to encompass social justice and the fight against poverty as key principles of sustainable development

The success of a sustainable future therefore depends on the way environmental education is effectively implemented in our schools. The state and secondary education has made efforts to integrate environmental education as a module in Biology but given the continuous current environmental hazards much still has to be done. It is important to insert environmental education as a subject in secondary and high schools, adopt teaching strategies on environmental education by encouraging outdoor education and green education, provide adequate infrastructural disposition and laboratories to be able to recycle waste effectively. Secondary schools should be able to manage its financial, human, material and logistics resources, as well as carry out effective supervision, and appropriate motivation of teacher so as to obtain a good educational output. The state is also expected to train teachers competent to teach environmental education in schools,

partner with other schools abroad through sustainable partnership programs as well connect with NGOs and laboratories which propagate environmental education.

➢ Rationale for the adoption of the sustainability framework or importance of sustainability

Sustainability is now a well-known and commonly accepted framework for guiding a wide variety of choices. Sustainability suggests that, in the decision making process, societies that have a good quality of life have an obligation to ensure both future societies and contemporary, less well off societies are also able to achieve a standard of living in which their basic needs are met. The Whistler (2020) sustainable community movement describes sustainability as "… a minimum condition for a flourishing planet in the long term." Communities are applying sustainability to solving energy problems, addressing waste disposal issues, developing green spaces, planning urban areas, and reinvigorating the local economy. Companies are using the concept of sustainability to expand the measure of success for their endeavors from the financial bottom-line to a triple bottom line that adds social and environmental performance to economic performance. Universities are applying sustainability to guide changes to their campuses, curriculum, governance, investments, procurement policies, and relationships to their local communities. In short, sustainability is a framework upon which can be built specific strategies for guiding decision making. For example, The Natural Step, developed in Sweden, is a sustainability-based strategy for making decisions about resources utilization and disposal. Numerous other strategies that have sustainability as their core concept have emerged and are being applied to guide decision making in the private and public sectors. The future is becoming ever more complex and it is increasingly difficult to safely navigate through the maze of issues that confront us. Humanity faces a future of much more costly energy, potentially catastrophic consequences due to climate change, shortages of potable water, the blowback of effects from the vast array of synthetic chemicals developed over the past half-century, and depleted fisheries, the rapid degradation of the environment, the increase global warming, to name but a few. And this is occurring in the face of still rapidly increasing numbers of humans and rising per capital consumption. Sustainability can provide many of the answers to how best to treat new environmental challenges and how to change the basis of decision making such that environmental education for sustainability benefits far outweigh the risk, for both the short and long term and for present and future societies (UNESCO, 2018).

"..meeting the needs of the present without compromising the ability of future generations to meet their needs." Inherent in this definition is the proposed responsibility of contemporary society for

the quality of life of today's population plus the preservation of resources, the environment, and other ingredients needed for future populations to also experience a good quality of life (UN, 2021). This is an enormous and daunting task and requires enormous changes in thinking, policy, and basic assumptions about the economy for its full implementation. For the present, it would mean that wealthier, more technologically sophisticated societies would have to contribute materially and through a wide range of assistance programs to increase the wealth of poorer nations, to aid them in developing the capability to provide the basic needs of their population. For future generations it means ensuring the availability of a wide range of resources: natural, cultural, mineral, educational, food, clean air and water, genetic diversity, and numerous others that support a good quality of life. The natural question to ask is: why apply the sustainability framework? In answering this question, vocabulary such as rights, obligations, and interdependence must be used (Whistler, 2020). Everyone on the Earth has a right to having their needs for food, shelter, and clothing met. Present people have an obligation to future generations to provide them an intact and functioning planet in at least as good state as they received it. Also we are all interdependent, present and future generations, but it is the present, wealthier countries that control the fate of everyone else, present and future. The application of the sustainability framework therefore requires a better understanding of the ethical concepts which support it. Among these ethical concepts are the Precautionary Principle, the Chain of

Obligation, the Distributional Principle, the Land Ethic, and the Rights of the Other Species (Whistler, 2020). Through a better understanding of the ethics of sustainability, it becomes clear why the sustainability framework is not only an approach to addressing and solving the many difficult problems facing us, but why it is in fact the right approach, the right thing to do.

- **Arms of sustainability**

Sustainability and sustainable development, conceptually represented under three pillars - environmental protection, economic development, and social development, has gained widespread prominence. Since then, it has been broadly intertwined with processes and actions of humankind to avoid natural resource depletion and to maintain ecological balance without hindering the quality of life. An ecological view of sustainable development sees it as a process which requires that the use of environments and resources by one group of people does not jeopardize the environments and well- being of people in other parts of the world or destroy the capacities of future generations to satisfy their reasonable needs and wants. The environment is not merely what is natural, it includes, as Gutiérrez (2007) says, the social, economic, political, cultural, local and planetary, and aesthetic

aspects, as well as research from a globalizing, integrating point of view of the different aspects and the relationships between them.

Economic sustainability refers to the ability of an organization to manage its resources and responsibly generate profit in long term. It aims at maintaining the capital intact and improving the standard of living without jeopardiwing the ecological and human systems (Benn et al. 2014). Social sustainability aims to preserve social capital by investing and creating services that constitute the framework of our society. This concept accommodates a larger view of the world in relation to communities, cultures and globalization. Environmental sustainability on the other hand aims to improve human welfare through protection of the natural capital (land, air, water, mineral etc.).Environmental sustainability as defined by Griffiths and Sutton (2000), places emphasis on how business can achieve positive economic outcome without any short or long term harm to the environment. Dunphy et al. (2000) propones that environmental sustainable business seeks to integrate all the arms of sustainability with equality.

Figure 2.4 Arms of Sustainability

- The intersection of economic and environmental sustainability- the environmental management view
- The intersection of environmental and social sustainability -the limits to growth view
- The intersection of social and economic sustainability- the growth with equity view

- The intersection of all three - environmental, economic and social sustainability - ecological sustainability.

Sustainability is commonly understood to require the balanced pursuit of three goods: ecological health, social equity, and economic welfare. It is grounded on the ethical commitment to the wellbeing not only of contemporary populations but also the wellbeing and enhanced opportunities of future generations. The scientific and technical professions have a special responsibility in this regard because the knowledge and technologies they develop and employ have immense impacts on natural environments, economies, and the empowerment of citizens and societies. Moreover, their efforts and achievements can continue to produce effects, for good or ill, well into the future. The concept of sustainability can provide guidance to develop the ability to protect the natural environment, as well as human and ecological health while minimally compromising on typical ways of life. Therefore, the sustainability strategy is to have a long-term vision for economic growth, mutually supporting social cohesion, and environmental protection (Diesendorf, 2000)

- **Life on land**

The environmental arm of sustainable development consist of protecting life on land, protecting life in water and protecting life in air. The 17 objective of the sustainable development goals also focuses on protecting life on land (SD goal 15) (UN 2015) Life on land is extraordinary and very essential. Forests cover nearly 31 per cent of our planet's land area. From the air we breathe, to the water we drink, to the food we eat–forests sustain us.

Around 1.6 billion people depend on forests for their livelihood (world economic forum 2023) Almost 75 per cent of the world's poor are affected directly by land degradation (UN 2016). Did you know that forests are home to more than 80 per cent of all terrestrial species of animals, plants and insects? And of the 8,300 animal breeds known, 8 per cent are extinct and 22 per cent are at risk of extinction (UN 2016). Biodiversity and the eco system services it under pins can also be the basis for climate change adaptation and disaster risk reduction strategies as they can deliver benefits that will increase the resilience of people to the impacts of climate change (UN Report 2022).

Our forests are home to more than 80% of all land-based species and our remarkable ecosystems allow us all to eat, breath and live (togetherband.org 2018). Yet through deforestation, global warming and meat-production, we're slowly killing our earth and its inhabitants. Before we panic, it's worth reminding ourselves, we can fix this. Goal 15 is all about working together to protect, restore and promote our planet's plants, insects and animals. By focusing on the changes we can

make now to help our future, we can sustainably manage forests, combat desertification, reverse land degradation and put a stop to biodiversity loss.

To sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss, the UN 2019 established some sub goals to ensure protection of life on land: Conserve and restore terrestrial and freshwater ecosystems, end deforestation and restore degraded forests, ensure conservation of mountain ecosystems, protect biodiversity and natural habitats, eliminate poaching and trafficking of protected species, prevent invasive alien species on land and in water ecosystem, Integrate ecosystem and biodiversity in governmental planning.

Increase financial resources to conserve and sustainably use ecosystem and biodiversity finance

- Combat global poaching and trafficking
- Reduce your use of paper. Avoid printing and substitute it with electronic devices or carriers. - Compost. Composting food scraps can reduce climate impact while also recycling nutrients

Well-managed protected areas support healthy ecosystems, which in turn keep people healthy (Stella S. 2019). It is therefore critical to secure the involvement of the local communities in the development and management of these protected areas (Andrade et al. 2012).Protecting life on land is essential to securing livelihoods of many populations around the world.

2.3.2. Sociodemographic factors and sustainable development

Sociodemograhic factors refer to a combination of social and demographic factors that define people in a specific group or population. When we talk about sociodemographic factors we mean the different social and demographic features which permit us know what members of a group have in common. These factors often include social status, religious background, educational level, professional level, age and gender (Sargisson RJ et al. 2020), just to name a few and they do influence the implementation and achievement of sustainability in a country or given locality.

Sargisson et al. (2020) examined the extent to which popular sociodemographic variables (gender, age, income, education, urbanization level, and political orientation) were predictive of environmental values for 11,820 participants across seven European countries. Overall, sociodemographics were hardly related to environmental values, only gender and political

orientation were weakly but significantly related to environmental values, whereby men and right-wingers showed weaker altruistic and biospheric, and stronger egoistic, values than women and left-wingers. We conclude that sociodemographic variables cannot be considered a suitable proxy for environmental values, and thus that behavior-change campaigns might be more impactful when focused on alternative segmentation strategies in relation to environmental aims.

Kollmuss and Agyeman (2010) analyze the factors that have been found to have some influence, positive or negative, on pro-environmental behavior such as demographic factors, external factors (e.g. institutional, economic, social and cultural) and internal factors (e.g. motivation, proenvironmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities and priorities. Result reveal that external factors such as demographic variables do influence pro environmental behavior. Ardoìn et al. (2012) in her work on An Exploration of future trends in environmental education research, attest sex, age, educational level and ethnicity as sociodemographic factors relating to EE for sustainability.

In Sunthonkanokpong (2019) study on sustainability awareness, attitudes and actions in pre-school teachers in Thailand, results also suggested that females outperformed the males in all categories. Sia et al (1986) also examined the relative contribution of 8 variables in predicting responsible environmental behavior in 105 Sierra Club members (aged 35–45 yrs) and 66 Elder hostel members (aged 55+ yrs). Seven variables were found to be statistically significant: (1) level of environmental sensitivity, (2) perceived knowledge of environmental action strategies, (3) perceived skill in using environmental action strategies, (4) psychological sex role classification, (5) individual locus of control, (6) group locus of control, and (7) attitude toward pollution.

The above research works seen in thus section stipulate the relevance of sociodemographic in research as a whole and on environmental behaviors for sustainability purpose.

2.3. Environmental Education for Sustainable development

Education has made many valuable contributions to societies and development globally, and is recognized for the important role it has in improving livelihoods worldwide. Quality education should prepare societies to actively participate in global politics and economics, as well as provide people with the skills necessary to make informed decisions and take responsible actions (Scott Reilly 2008). Throughout the world, societies have recognized education as a key component of sustainable development. This task is not the responsibility of the formal education alone (EETAP, 2000) but the non-formal education (NGOs, public health educators, nature centers, agricultural

extension agents) and the informal education (newspapers, local television, radios). Education that focuses on sustainable development and critical thought has an increased likelihood of success and environmental education's multidisciplinary nature makes it an ideal strategy for development (Fien & Tilbury, 2002).

Sustainable development has been promoted since its inception over 20 years ago as an effective means to abate the degradation of human and environmental systems. The United Nations defines sustainable development as a development strategy that focuses on meeting the demands and needs of present-day citizens without compromising the future's ability to meet theirs'. Sustainable development concentrates on aspects of the economy, society and environment in order to achieve its goals (Hart, 1997). However, it can be an often misused or overused statement in the endorsement of policies worldwide, drawing attention away from the 3 original environmental intentions of the strategy and focusing more attention on the social and/or economic aspects. The economic, social, and environmental aspects of sustainable development and policy formation should be equally represented and balanced (Hart, 1997). In 1992, the United Nations and representatives from 178 countries met in Rio de Janeiro to discuss the state of the environment and social/economic development and to craft a political course of action for these topics. The Rio Summit was the result of an identified need to develop more appropriate, sustainable strategies in addressing development. Agenda 21was an important outcome of the Rio summit, and focused the world's attention on the objectives necessary to reach sustainable development. Agenda 21stated that in order to accomplish these objectives "… [there is] the need for individuals, groups and organizations to directly participate in environmental impact assessments and to know about and participate in decisions which potentially affect the communities in which they live and work" (Agenda 21, 2008). The identification of Agenda 21'ssustainable development objectives were initially met with much debate, however, near unanimous agreement was eventually reached in the need to improve education standards worldwide (Sitarz,1993). Education involves more than simply increasing literacy rates of citizens; it should also facilitate the development of skills necessary for continued learning once formal schooling is complete such as critical thinking and communication. Agenda 21's fundamental educational objectives recognized the need for an increased societal awareness towards the environment and development (Sitarz, 1993). Formal education that focuses on sustainability has been shown to aid in development aspects later in life such as increased agricultural production, women's rights, standards of living, and lowered birthrates (Hopkins & McKeown, 2002).

To achieve the educational objectives set forth by the United Nations in 1992, governments, administrators and teachers worldwide have to identify and understand the need for different strategies to be used. This is especially true for developing nations. An essential component for education in the developing world is that it needs to address the concerns of the poor, focusing on issues that affect populations directly such as improved health and nutrition (Hernandez & Mayur, 2000). The increased attention of issues-based educational concepts is also multidisciplinary, infusing aspects of the biological, physical, social, economic and spiritual environments to strengthen the effectiveness of education (Sitarz, 1993).

Agenda 21 is geared towards promotion of sustainable development at the local level. Global education reform that focuses on issues affecting citizens, specifically youth, at a local level can influence the relationship, interest, and understanding between humans and environmental systems. Through the development and application of knowledge, skills, values and behaviors necessary to inspire critical thought processes, youth will be able to increase their capacity to explore and understand issues more thoroughly and identify appropriate courses of action (Bory-Adams, 2006; Fien & Tilbury, 2002). Education reform has the potential to include the world's youth on many facets of sustainable development, and to give them the tools necessary to overcome many of the challenges faced in the future. Youth may play an important role in meeting the objectives of Agenda 21. Agenda 21 looked at youth's vital role in the realization of sustainable development, focusing on their right to receive a secondary education that is innovative and aimed at building practical problem solving skills. Agenda 21also addressed the need for the increased participation in the environmental decision-making process for youth of both genders (Sitarz, 1993).

The use of environmental education programs that focus on fostering ownership, empowerment, and active participation may have the potential to positively influence youth in meeting the goals of sustainability stated by Agenda 21, and be a key contribution to educational reform. A good number of authors agree that environmental education aims to achieve sustainable development. Vilá et al. (2021) obtained as a result the usefulness of environmental education is limited by social and economic pressures, including extractive activities. Farfan et al. (2021) also highlight the enormous potential of environmental education to ensure sustainable development during the inevitable process of change in traditional Andean pastoralism. Marquez Delgado et al. (2021) shows among its main results that, since the appearance of environmental education, its motivation has been the search and construction of pedagogical alternatives focused on sustainability as a priority. According to Pérez et al. (2021) there is a link in the approach of the Doñana, Biodiversity and Culture program and by implementing activities based on the thinking of the

informants, it is sought that they acquire the commitment to perpetuate this territory over time and its conservation developing environmental citizenship for the future as responsible citizens committed to the sustainable development of the territory. According to Shutaleva et al. (2020), It seeks to implement basic principles and trends of environmental education in Russia to develop the concept of sustainable development and great attention is paid to interactive environmental lessons for school children, which are offered by environmental organizations. In turn (Sebastián-López & González, 2020) in their data collected from the research and results indicates a positive impact of mobile learning in environmental education for sustainable development.

It is claimed that environmental education along with sustainable development is the only important thing to be studied in Indonesian schools, it was integrated into subjects such as social sciences, natural sciences, geography and biology. Studies on geography to promote sustainability had not been done correctly in Indonesia. Regarding Indonesia they have contained three main parts of sustainability: the environment, which is the most declared, then social and economic. His most widely used learning model and method was outdoor learning with a contextual method. The learning media mentioned were maps, and the learning resources were local wisdom. In general, it has been shown that the topics related to the sustainability elements contained in the articles on geography and education in Indonesia, include their learning components (Hawa et al., 2021). So promoting sustainability, knowledge, and attitude students is a priority.

On the other hand, sustainable development is one of the global and central objectives of current policy. Education must play a fundamental role in achieving a sustainable society. In a research on the understanding of Slovenian and Austrian biology teachers with environmental education and environmental awareness. Students from both countries were found to know some pedagogical principles of education for sustainable development, such as active and transformative learning. The analysis focused on the Sustainable Development Goals showed that students and teachers only mentioned some of them. Research results contribute to the evaluation and development of the curriculum for biology students and teachers (Bezeljak et al., 2020). The participants presented a good knowledge of environmental education, however, they lack understanding of the interconnections between the environmental part, economic and social dimensions related to sustainable development.

Findings of Agirreazkuenaga and Martinez (2021) in Secondary students' perception in Basque in

Spain, positioning and insight on education for sustainability show that the students had sufficient knowledge and information about the socio-environmental problem; however, their behavior did not correspond to their way of thinking.

2.4. Empirical studies Environmental Eduction for Sustainble Development

Thanks to EE's interdisciplinarity, numerous research areas are ripe for examination in this way. Rickinson (2001), for example, conducted an extensive review of learners and learning in EE. Whereas Stern, Powell, and Hill (2014) investigated programmatic best practices, Williams and Dixon's (2013) systematic review focused on academic outcomes within the context of school gardens. In congruence with the Cameroon national education policy 2019 in a bid to empower students through flexibility in course choices stipulates that, all school subjects will be considered curricular rather than extra-curricular or co curricular, including sports, yoga, dance, music, drawing, painting, sculpting, pottery making, woodworking, gardening, and electric work. The mention of gardening already portrays aspects of EE in the curriculum and on the other hand calls for the need of more EE in the curriculum.

In working with a range of EE stakeholders, including researchers, practitioners, and funders, there is a need for a more robust understanding of what outcomes are addressed in various sectors of this field. It is worth considering how to better understanding, and under what conditions, EE with schoolaged youth relates to diverse outcomes, including non-environmentally related outcomes such as, academic achievement, youth development, and social and emotional learning (Nicole, 2017) Environmental education and K-12 student outcomes: A review and analysis of research, The Journal of Environmental Education, 49:1, 1-17). Ladwig (2010) noted that EE programs measuring environmentally specific outcomes such as environmental knowledge, attitudes, skills, and behavior often extend to include both personal and interpersonal outcomes. Stevenson et al. (2013) discuss how EE goes beyond mere understanding and conceptualization to developing learners' agency, including a problem-solving orientation. Through focus groups and surveys with EE participants and practitioners, West (2015) identified a large number and range of outcomes, noting an emphasis on knowledge for both groups, plus social outcomes among participants. Likewise, previous literature has suggested that environmental educators express diverse opinions about both the shorter- and longer-term goals of their work (Ardoin et al., 2015; Hart, 2007). Ardoin et al. (2018) focused on environmental knowledge, attitudes, behaviors, and skills, they desired to uncover the breadth of EE outcomes under study using an exploratory process similar to

Williams and Dixon's (2013) schoolgardens review. They saw that these domains are important in EE to achieve sustainability.

Sunthonkanokpong (2019) carried out a study on sustainability awareness, attitudes and actions in pre-school teachers in Thailand. The purpose of this study was to survey the awareness, attitudes and actions of Thai, pre-service, industrial-education teachers (N=390) regarding economic, social and environmental sustainability. Survey items were derived from learning objectives provided by UNESCO in relation to 17 sustainable development goals (SDGs). Results showed an average overall higher percentage in the categories of attitudes (90%) and action (91%) than for awareness (69%). The lowest ranked items in the categories of attitudes and action were related to SDG 5, gender equality. Pre-service teachers in year two of their program reported significantly higher levels of awareness than those in their first, third, fourth or fifth year. There were no significant differences for program type. Implications point to the value for higher education institutes, programs and instructors of identifying sustainability issues most relevant to their context in terms of culture and subject area. Results also pointed to the possibility that higher education institutions may be able to address aspects of sustainability through other initiatives (e.g., mental health awareness days) that are not necessarily branded specifically as sustainability issues.

The aim of this nationwide survey was to assess undergraduate students' environmental literacy level in Taiwan. A total of 29,498 valid responses were received from a number of selected colleges and universities in Taiwan, using stratified random sampling method. A total of 70 items were used to assess the environmental literacy and the results revealed that undergraduate students had a relatively low level of environmental knowledge and behavior, while a moderate level of environmental attitudes was attained. The findings also indicated no significant correlations between knowledge and attitudes or between knowledge and behavior. However, a higher level of environmental knowledge significantly correlated with a higher degree of pro-environmental behavior, and a higher level of environmental knowledge correlated with stronger attitudes. Results from this study could contribute towards further relevant policy discussion and decision-making, curriculum design and development to the improvement of environmental education in the higher education sector.

Furthermore, a study on the principles of environmental management in Cameroon, which investigated lower secondary and the national level principles of environmental management which are contained in Article 9 (a) – (f) of the 1996 Law Establishing the Regime of Environmental Management in Camerooon4 (here in after referred to as the '1996 Law'). The only problem is that

the law referred to here above is a framework law and its legal enforceability is not as enough as to command any specific legal enforceability of these principles. In any case, the baseline is that principles of law may also be founded on legal texts once they are identified and ascribed some particular legal regimes. This is not as if to mean that legal texts create principles of law, they rather constitute solid basis or foundations for these principles.

To sum it up, this chapter has profoundly presented a critical review of the concepts used in this study from which the main variables and items were selected. It has also attempted a critical presentation of environmental education and sustainable development. Lastly, the chapter attempted a critical review or some related or empirical literature in order to show the gap with the present study. This section of the work has justified the need for the appraisal of the influences and effect of environmental education on sustainable development in the Yaoundé VI sub-division in the centre region of Cameroon. This leads us to the next chapter which focuses on the theories used to carry out the research.

CHAPTER 3: THEORETICAL FRAMEWORK

This section discusses in some depth the theories and model behind environmental education for sustainability. A theory according to Kimbrough and Nunnery, (1983:245) is "*a set of relevant, internally consistent postulates about a particular observable phenomenon along with definitions to enable the user to move from the abstract to the real in order to describe, explain, predict, and / or advance knowledge*". According to (Neumann, 2014) scientific theory is a coherent system of logically consistent and interconnected ideas used to condense and organize knowledge. Mvessomba (2013) designates it as a set of logically interrelated propositions whose purpose is to explain in a general way a certain number of phenomena. This implies that theories are guide posts to all fields of human endeavors that prevent studies to be based on mere judgment derived from experience, guess work or conjecture but on chosen line of action guided by experience derived from scientific research. As a result of the above claim, the study has drawn inspiration from the theory of planned behavior (TPB) and the Triple bottom line theory of sustainability (TBL) to assess the impact of environmental education on sustainable development in protecting life on land.

3.1: The planned behavioral theory

The theory of planned behavior is generally used to analyze the behavior of individuals (Zitoumi & Ezzina, 2007). It was set up to overcome the limitations of the theory of reasoned action (TRA) developed by Fishbein and Ajzen (1975). This limit of the theory of reasoned action concerns its insufficient character to predict all human behaviors, especially those that are not under the volitional control of Ajzen (1991). Indeed, unlike TRQ, PBT takes into account all the internal or external constraints that the individual is likely to undergo when he wants to engage in a specific action. Thus TCP is presented as an extension of TRA (Ajzen, 1991; Nache & Trudeau, 2000). In this perspective, it uses the same conceptual bases as TRA, while adding a third variable, namely perceived behavioral control. According to Godin (1991), the objective of the theory of planned behavior is to predict specific and evolving behavior in a specific situation. In this perspective, as shown by Ajzen (1991), the theory of planned behavior makes it possible to describe and understand the attitudinal, subjective and contextual dimensions of individual behaviors with a useful goal that would be to give the possibility of intervening with individuals with a view to behavior modification. These words of

Ajzen lead us to highlight three factors that determine behavioral intention

3.1.1. Assumptions of the PBT

The theory of planned behavior (TPB), a modification of the theory of reasoned action, was based on the assumption that human beings are usually quite rational and make systematic use of the information available to them (Ajzen and Fishbein 1980). The theory contended that people estimate certain factors before deciding to engage or not engage in a behavior (intent factor). The TPB states that your intentions are the best predictor of your behavior. If you believe taking care of the environment is a good thing, then you are more likely to make an effort towards gardening, waste management and recycling.

Ajzen assumes that behavior, intention, devoid of unforeseen circumstances that limit individual control, will help predict future behavior. His principles state that variance in intention is composed of three key constructs: attitude toward the behavior, subjective norms, and control.

Intentions: According to Abdou (2022), intention is apprehended as a deliberate intention for such and such an act" (p .588). They are also representations of a goal, the content of a thought, a belief or a desire, etc. For Noumbissié (2010) the intention represents the desire, the wish, the determination or the will to emit a behavior. This definition goes in the same light as that proposed by Isabelle (2008), who says the intention is the expression of the motivation of the person to adopt or not to adopt a behavior. These different definitions of intention show that it occupies a central place in the establishment of a behavior but also will be in a way the driving force that leads the individual to act in such and such a way. It is in this perspective that Ajzen (1991) evokes the fact that we predict a behavior by using only the behavioral intention and by treating it as the precursor of the action. It appears in this context as the best predictor of a given behavior. We can therefore understand that the weaker the intention, the lower the probability that the behavior will manifest itself. On the other hand, the stronger the intention, the greater the probability for an individual to manifest a behavior.

Behavior is a function of your intentions, which you can think of as being your desire to perform the behavior. Imagine that you have some desire to take the course but you haven't actually signed up for it yet. Why not? It's because there is a gap between your intention and your behavior. One way to overcome this gap is by making **a plan**, for example, simply planning out what action you will take and when. In psychological parlance, this plan goes by the name of an implementation intention. However, the desire or the will to act or behave is also made possible by the attitudes, the subjective norms and the perceived behavioral controls.

Attitudes: At the beginning of the 20th century, experimental psychology works reveal that the term attitude appears different from common sense (posture, the way of holding oneself). It is a factor existing between the stimulation and the response of individuals to an issue. The concept of attitude therefore refers to the influence of the mental dispositions of individuals on their behavior. At the same time in the United States, this notion is used in sociological and psychological research, in particular to explain social behaviors and their orientations. It represents the internal disposition of the individual underlying his perception and his reactions vis-à-vis an object or stimulation (Tapia & Roussay, 1991).

The notion of attitude first appeared in general psychology to "*explain the variations in an individual's response to the same stimulus when the attention of his perception is drawn to one or two aspects*" (Mathieu et al. 2000). It is also the "*effect for or against a psychological object. (...) Attitude is used to describe a potential action with respect to this object depending on the question whether the potential action will be favorable or unfavorable with respect to this object*" (p. 261) . Allport (1935) notes that "*it is the most indispensable concept of contemporary social psychology"* (p.109). For this author, attitudes have a pragmatic character. They are "*our guides to find our way in an ambiguous universe*" (Allport, 1935, p. 806). For Bloch et al. (1997), the attitude designates "*the durable internal disposition which underlies the favorable or unfavorable responses of the individual to an object or to a class of objects of the social world*" (p.119). According to Maisonneuve (1982), "*attitude consists of a position or expression (more or less crystallized) of an agent (individual or group) towards an object (person, group, situation, value*)" (p.111). It is expressed more or less through various indicators (word, tone, gesture, act, choice or in their absence). It exercises a function that is both cognitive and energetic under the behaviors that it underlies. He underlines that attitudes are acquired and not innate, they are more or less susceptible to change under the effect of external influences. Eagly and Chaiken (1993) define attitudes as tendencies to evaluate an entity with some degree of favor or disfavour, usually expressed in cognitive, affective and behavioral responses. A relatively stable tendency to respond to someone or something that reflects an evaluation (positive or negative) of that person or thing. Behavioral responses are among the ways in which the individual can express his evaluation.

Through these different definitions of the concept of attitude, we can say that an attitude is a predisposition to react in a systematically favorable or unfavorable way towards certain aspects of the world around us and environmental issues to be specific. Attitude can also be viewed as a psychological tendency expressed by rating a particular entity with varying degrees of favor or disfavor (Eagly & Chaiken, 1993). Attitude is also the sum of evaluations directed towards certain

psychological objects (Ajzen, 2001) or a constant pattern of evaluative responses towards a person, object or aspect (Coleman, 2003). Thus, faced with environmental education, a person can be either exhibit favorable or unfavorable behavior towards environmental issues. In this case, an individual can therefore either exhibit positive attitudes towards environmental issues thanks to environmental education or refrain from showing a positive behavior.

Your attitude towards a behavior will affect how likely you are to perform that behavior. If you believe that the behavior will make a positive difference in your life, then it's more likely that you will perform the behavior. Let's consider the likelihood that you will take a new course to improve your skills. If you believe the course improves the chances of getting a promotion, then you are likely to have a positive evaluation of the behavior (taking the course). If you think that the course won't lead to a promotion and would also take a lot of your spare time, then you're more likely to have a negative evaluation of the course. Similarly if a student believes that environmental education will permit him get a job after his course he will definitely take the course serious and by so doing he will develop positive attitude towards the environment which will also influence sustainability of our planet. In short, attitude answers the question, "**What do I think**"?

Subjective Norms: Ajzen (1991) defines subjective norms as the perceived social pressures to perform or not perform a behavior. In other words, the perceived social norm corresponds to the individual's perception of social pressure concerning what close people, family and friends think of what he would like to undertake (Fayolle, Gailly & Lassas-Clerc, 2006; Tounes, 2003). For Isabelle (2009), the subjective norm is a construct that refers to an individual's perception of whether or not people important to him approve of adopting a given behavior. When it is direct, it groups people in general. If this construct is indirect, it is formed by normative beliefs multiplied by an individual's motivation to conform (Godin, 1991). As such, it encompasses all of a person's beliefs about the expectations of people who are significant to them.

According to Cestac and Meyer (2010), the subjective norm refers to the beliefs attributed to others, and especially those who are close to us. In the model of planned behavior, the subjective norm represents the individual's idea of what people, and especially those who are important to him, think of this behavior. For example, my best friends would appreciate if dispose waste properly to conserve my environment. Some authors (Kallgren, Reno & Cialdini, 1990; Cialdini, 2003) have distinguished this subjective norm into an injunctive norm (what is expected of me) and a descriptive norm (what others do).

Subjective norms is determined by the normative beliefs of the person, that is, by the importance that he gives to the opinion of certain people or groups of people and by his motivation to conform to the opinion of these people or groups of people (Ajzen, 2001). For example, a person may believe that their parents, teachers, friends, environmental policies, etc. (normative beliefs) think the he should practice gardening to conserve and sustain biodiversity. On the other hand, this same person may differ in his general desire to conform (motivation to conform) to the expectations of his parents, teachers, his friends, and the environmental policies. Subjective norms look at what others in your social circle, the people that you interact with, think about the behavior. One's behavior is to some extent shaped by what others believe, particularly those close to you. If one's parents, teachers, friends took a course (the behavior) on waste management and gardening practices and found it beneficial, then you are more likely to want to take the course. It is important to note that, just because others close to you have particular attitudes and beliefs, it doesn't mean you will always view the world in the same way. Thus subjective norms answer the question, "**What do others think**"?

From the above, we can retain that subjective norms are the perception by an individual of the opinions of other people important to him concerning a behavior (Ajzen & Fishbein, 1980). Within the framework of the PBT, the subjective norm is determined by two elements, which are the normative beliefs and the motivation to conform. This norm also appears to be an important determinant of behavioral intention. Thus, the outcome of a behavior such as gardening practices will depend on the individual taking into account the point of view of the people he considers. However, the establishment of an intention or the realization of a behavior seems based on another dimension of the TCP: the perceived behavioral control.

Perceived Behavioral Controls: So far we've stated that your behavior is a function of your intentions, attitudes and subjective norms. It is also a function of perceived behavioral controls. Perceived behavioral control is the last predictor introduced by Ajzen (1991). According to Ajzen (1991), perceived behavioral control corresponds to the perceived ease or difficulty in performing a behavior. It refers to the perception that a person has regarding the feasibility of a given behavior.

The concept of perceived behavioral control is very close to Bandura's concept of self-efficacy (1977) (Tounès, 2003; Emin, 2003).

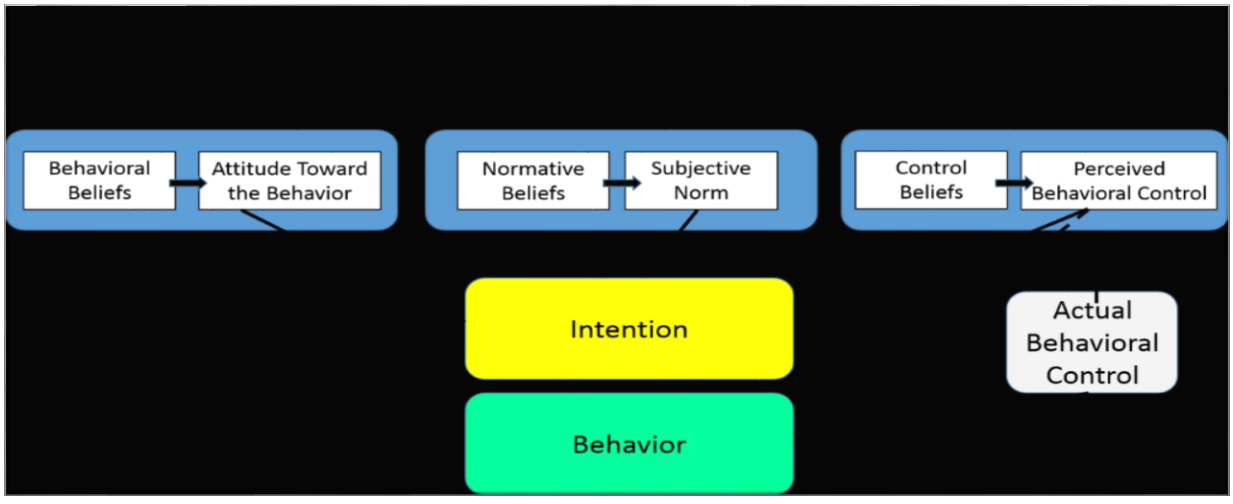
This variable refers to the perception of the level of difficulty of a behavior (easy or difficult) and is composed from control beliefs based on past experience and anticipated obstacles (Ajzen, 1991). This variable consists of the external conditions (opportunities) that facilitate, moderate or hinder

the individual's ability to adopt certain behaviors and the individual's perception of his resources and ability to achieve it (Ajzen, 1991). Among the control factors, Ajzen (1991) highlighted internal factors such as the lack of information, skills or competences as well as external situational or environmental factors such as the lack of opportunities and dependence on others. Thus, an individual with the necessary resources and opportunities and faced with few obstacles will have a high perception of control (Ajzen, 1991). According to Ajzen (1991), perceived behavioral control is similar to Bandura's (1977) definition of the concept of perceived self-efficacy, i.e. people's perception of their ability to exercise control over their own lives and the events that may affect them.

Perceived behavioral controls look at whether you believe you have the tools or the means required to exhibit the behavior. If you think that you're not clever enough to take the course then you're less likely to take it. Similarly, if you believe that you can't afford the course then you'll be less likely to sign up for it. Perceived behavioral controls thus answer the question, "**Can I do it**"? Percieved behavior is the key difference between the theory of planned behavior and the theory of reasoned action.

The arguments that we have just presented make it possible to highlight the main dimensions of PBT. Similarly, the description of these dimensions allows us to situate the importance of this theory in understanding and predicting behavior in a specific situation. The theoretical considerations that this theory offers have been used to study behaviors in relation to the environment.

Figure 3.1 Schematic Representation of the Theory of Planned Behavior



(Source:Researcher 2021)

Limitations

Ajzen's theory of planned behavior left some loopholes in his explanation of behavioral intensions.

He assumes the person has acquired the opportunities and resources to be successful in performing the desired behavior, regardless of the intention. It does not account for other variables that factor into behavioral intention and motivation, such as fear, threat, mood, or past experience.

While it does consider normative influences, it still does not take into account environmental or economic factors that may influence a person's intention to perform a behavior.

It assumes that behavior is the result of a linear decision-making process, and does not consider that it can change over time.

While the added construct of perceived behavioral control was an important addition to the theory, it doesn't say anything about actual control over behavior.

The time frame between "intent" and "behavioral action" is not addressed by the theory.

Significance of TPB to this Study

This theory is a behavioral intension theory and clearly explains that intensions are the best predictors to ones behavior. Once students are taught to have a positive toward the environment, and they come to realize that the community has same interest to care for the environment and reduce environmental pollutions, they will be motivated to positive actions toward care for the environment with the help of all knowledge, skills and values impacted on them by teachers in EE.

Educational and curriculum planners, pedagogic inspectors and teachers with guidelines of this theory will better strategies and plan the curriculum such that the appropriate skills, values, and knowledge (notion on gardening, waste management and recycling) towards EE are passed on to our learners for a better today and tomorrow.

3.2. Triple bottom line theory of sustainability

Well before Elkington introduced the sustainability concept as "triple bottom line," environmentalists wrestled with measures of, and frameworks for, sustainability. Academic disciplines organized around sustainability have also multiplied over the last 30 years. John Elkington strove to measure sustainability during the mid-1990s by encompassing a new framework to measure performance in corporate America. This accounting framework, called the

triple bottom line (TBL), went beyond the traditional measures of profits, return on investment, and shareholder value to include environmental and social dimensions. Savitz (2006) defines TBL as a theory which "captures the essence of sustainability by measuring the impact of an organization's activities on the world, including both its profitability and shareholder values and its social, human and environmental capital.

TBL wasn't designed to be just an accounting tool but to provoke deeper thinking about capitalism and its transformation towards a better future. By focusing on comprehensive investment results, with respect to performance along the interrelated dimensions of profits, people and the planet (3Ps) triple bottom line reporting represents an important tool to support sustainability goals.

Triple Bottom Line works on the assumption that the corporation is a member of the moral community, and this gives it social responsibilities. This theory focuses on sustainability, and requires that any company weigh its actions on three independent scales: economic sustainability, social sustainability, and environmental sustainability; which are all aimed at long term sustainability.

In 1994, John Elkington coined the term "triple bottom line" as his way of measuring performance in corporate America. He saw that a company can be managed in a way that not only makes money but which also improves people's lives and the well-being of the planet. The concept behind the triple bottom line is that companies should focus as much on social and environmental issues as they do on profits. The triple bottom line aims to measure the financial, social, and environmental performance of a company over time. TBL theory holds that if a firm looks at profits only, ignoring people and the planet, it cannot account for the full cost of doing business.

Elkington's TBL framework advances the goal of sustainability in business practices, in which companies look beyond profits to include social and environmental issues to measure the full cost of doing business. Triple-bottom-line theory says that companies should focus as much attention on social and environmental issues as they do on financial issues. TBL theory also says that if a company focuses on finances only and does not examine how it interacts socially, it is not able to see the whole picture and therefore cannot account for the full cost of doing business. The TBL consists of three elements: profit, people, and the planet.

Profit (Economic sustainability): It measures the positive and negative impact an organization has on the local, national and international economy. This includes creating employment, generating innovation, paying taxes, wealth creation and any other economic impact an organization has. Thus

it is the traditional measure of corporate profit. Profits do matter in the triple bottom line just not at the expense of social and environmental concerns. A decision which creates an economic boom but causes long-term harm, to the environment would likely reduce this bottom line to such a degree that the action would be untenable.

People (social sustainability): It measures the positive and negative impact an organization has on its most important stakeholders. These include employees, families, customers, suppliers, communities, and any other person influencing or being affected by the organization. Thus seeks to see how socially responsible an organization has been throughout its history. It gives precedence on the balance of economic power in the society. The presence of competition in the business arena is ok, but maximizing the bottom line in social terms requires that a business foster an environment in which all can succeed. In order words, it is better for a whole society to thrive than for one single corporation to thrive alone.

Planet (environmental sustainability): It measures the positive and negative impact an organization has on its natural environment. This includes reducing its carbon footprint, usage of natural resources, toxic materials and so on, but also the active removal of waste, reforestation and restoration of natural harm done. Thus seeks to evaluate how environmentally responsible a firm has been. Environmental sustainability stems from the recognition that resources are not infinite, and leads to the reasoning that too much degradation will worsen the lives of us, our children and that of future generations. Members of the moral community ought not to cause undue harm to the people around them and the people who will come later, and so this bottom line values some protection of the environment.

Figure 3.2 Schematic Representation of the Triple Bottom Line Theory

(Source: Researcher 2021)

This theory is of utmost importance to our work in that ignoring the application of the TBL may lead to Destruction of the rainforest, Exploitation of labor, Damage to the ozone layer. This theory invites educational planners to consider not only the economic output or social output but the environment sustainability when planning school curriculum and laid down objectives. If educational policies, educational objectives, and curriculum planners target the attainment of educational objectives in consideration of these 3 constructs, they will be more likely to take actions which are to the benefit of both the educational institutions, the society and the environment. The effective application of this theory in the educational sector will permit stakeholders to increasingly get aware of not only the consequences businesses have on the environment, community, and the economy but also of the importance of global issues, such as climate change and social justice. This theory aligns with the OECD 2015 standards which had as theme "Investing in the future: People, planet, prosperity." Guttenstein et al. (2010),shed some light of the use of TBL in the agricultural sector. Lacy et al. (2010) and Berns et al. (2009) further reinforce the importance of TBL as the main proxy to represent and measure sustainability in organizations

Consider a clothing manufacturer whose best way to maximize profits might be to hire the least expensive labor possible and to dispose of manufacturing waste in the cheapest way possible. These practices might well result in the greatest possible profits for the company, but at the expense of miserable working and living conditions for laborers, and harm to the natural environment and the people who live in that environment.

Limitations

A key challenge of the TBL, according to Elkington, is the difficulty of measuring the social and environmental bottom lines. Profitability is inherently quantitative, so it is easy to measure. What constitutes social and environmental responsibility, however, is somewhat subjective.

Drawing from the TPB theory it permits us to describe and understand the attitudinal, subjective and contextual dimensions of individual behaviors and in our context we focus on pro environmental behaviors toward achieving sustainability. On the other hand, the TBL theory in our context permits us to focus on comprehensive environmental educational investment results, with respect to performance along the interrelated dimensions of profits (educational outcome), people (our students) and the planet. It also captures the essence of sustainability by measuring the impact of the educational activities on the world, including both its profitability and shareholder values and its social, human and environmental capital.

In this chapter we had two principal theory: the theory of planned behavior by Ajzen (1991) and the triple bottom line theory by Elkington (1994), which constituted our theoretical framework. We presented their history, their propositions, their dimensions and their applications. The planned behavior theory shows that attitudes in relation to protecting life on land; the subjective norms, and the perceived control behaviors influences environmental behaviors. The triple bottom line theory equally shows that the people behaviors and activities and profits have an influence on the sustainability of environment (planet). The application of these theories will be seen in the next chapter.

CHAPTER 4: METHODOLOGY

According to Amin (2005), every scientific research work requires a clearly justified method section which presents the participants, instruments or methods of collecting data, design and procedure, in order to attain the desired results. In this section of the work, the research methods that were used to investigate the influence of environmental education on sustainable development in some selected secondary schools in the Yaoundé VI sub-division in the Centre region of Cameroon will be presented. Eight rubrics will build up this chapter: area of study and the target population, sample size and technique, the variables, research plan, the hypotheses, research instruments, statistical tool and difficulties encountered on the field. The third section dwells on instrumentations and procedures used for data collection. Section four deals with the procedures of data analysis and the last section presents the variables of the study including the recapitulative table.

4.1. Area of Study

According to Gall and Borg (2003), the careful selection of a research site for this study will helps to ensure the success of the research study. The study will involve students in the Yaoundé VI subdivision, in the center region of Cameroon, position at 3^{o} $50^{'}25^{''}$ North and 11^{o} $29^{'}$ $12^{''}$ East. This locality covers a surface area of $22.16km^2$ and has a total population of about 268,428. It has three public secondary schools, two bilingual high schools (GBHS Etougebe and GBHS Mendong), one technical college (GTC Mewoulou) and 16 lay private schools (Statistics of the Regional delegation of Secondary education 2022).

The researcher chose to carry out the study in Yaoundé VI for the following reasons: Yaoundé is a cosmopolitan town with a good number of government and lay private schools and a very good student population of a bilingual nature compared to other towns. Being the capital of the central region and the country at large with top educational institutions where policies and decisions are established, gives this study an advantage of implementation of results. We sampled two schools: Government Bilingual High Schools Etougebe and COSBIE- Simbock.

4.1.1. Government Bilingual High Schools Etougebe

GBHS Etougebe is a bilingual institution, found in the center regon of Cameroon, precisely in the Mfoundi division and the Yaounde VI subdivision. This institution was created in 1991 and

operates under the motto: Discipline, Work, success. This school has had a series of principals heading the institution and currently has a staff size of 267 teachers covering both the Anglophone and Francophone subsystem of education with a student enrollment of about 6000. It has a 80 classrooms which welcomes the students, an administrative building, a staff room, 3 large well eauiped laboratoires, a dinning shade, a staff restaurant,several toilets, a parking lot and a large compound for easy circulation and recreational activities.

4.1.2. COSBIE- Simbock

COSBIE is a coeducational institution, bilingual in nature and of the general education with both secondary and highs school levels. It is situated in the Mendong neighborhood, positioned at latitude 3.82611 º north and longitude 11.4705 º east precisely behind tradex Simbock in the Yaounde VI municipality. COSBIE operates under the motto: I Ought, I can, I will. It has a student enrolllment of 1096 and a staff size of 96 teachers covering both the Anglophone and the Francophone subsystem of edcuation. COSBIE has two large building consisting of 36 classrooms, 5 administrative offices, two laboratories, a staffroom, a dinning shade and a large well paved playground.

4.2. Sample Size and Technique

We worked with 200 students from the two schools mentioned above who were selected using the purposive sampling. The choice of this technic is because is prescribes the inclusion and exclusion criteria which we used to permit us select our participants. These criteria include:

Inclusion Criteria:

- Demographically those included in the studies are students of GBHS ETOUG-EBE and COSBIE Simbock of the Yaoundé VI municipality. The common fact about this population is that it is dynamic and has a large number of students of the general population of the Yaoundé IV sub-division and it is expected to exhibit awareness on environmental education. Also teachers and students are the ones in direct contact with the school curriculum. It is on this population that the results of the study will be generalized
- The accessible populations of this study are students and teachers of Form 3 and Forms 4 of the selected secondary schools of in the Yaoundé IV sub-division.
- The students were those who have been in these schools for 3 to 4 years consecutively with no gender and regional bias.

- Students should be of age range 10-20years. This is the immediate population on which the investigation will be carried out; the data will be collected for further analysis in the study. The reason for the researcher's choice is due to its accessibility, the longevity of these students in secondary school and their expected awareness of environmental education and environmental hazards. This choice was also based on the fact that the characteristic of this population is representative of the target population and the accessible Population.
- Students should be of the English section and of English expression.
- Students should be of the sciences
- Be present in school on the day of administration of questionnaire

Exclusion Criteria:

- Demographically those not included in the studies are students of the Yaoundé VI municipality not schooling in GBHS ETOUG-EBE and Quality international college TKC. This is in consideration of the time limitation, financial limitation, geographical limitation, theoretical and empirical limitation.
- Within the selected population, those not included in the accessible populations of this study are students in the schools of choice but not in F3 and F4 students.
- Within the choice of classes students who have not been in these schools for 3 to 4 years consecutively and with no prior knowledge on environmental education were excluded.
- Furthermore, students not within the age 10-20years in these classes were also excluded from the study.
- This research excluded all other sampling techniques but for the purposive sampling technique, reasons been that the researcher sampled students and the teachers based on the perception that they have the right information on environmental education for sustainability.

4.3. Variables

In this study, the researcher used two variables: a dependent variable and an independent variable.

4.3.1. Independent variable

The independent variable of this study is Environmental education (EE). Borah (2007) defines environmental education as a learning process that increases peoples knowledge and awareness about the environment and environmental challenges, while Farfan et al. (2021) sees environmental education is a process that encourages the development of capacities to balance human activities in

the environment. EE is a construct with four modalities: Waste Management, Education on gardening, Education on green partnership and Green pedagogic actions.

Ardoin et al. (2012) and the UN report 2020 attest these modalities as important in achieving environmental education. Farfan et al. (2021) affirm gardening as well as green pedagogic actions as important modality in achieving environmental education. Marín et al. (2021) shows us how the school garden has been used as a didactic strategy based on the school research model and its results show that this resource helps in teaching the environmental part. Chipantiza-Masabanda et al. (2021), also attest to the significance of education on gardening in environmental education.

- Waste Management: this is the strategy, processes and actions required to manage waste from its inception to its final disposal. This often includes avoidance, reduction, reuse, recycling, and treatment, all with the aim to minimize pollution and energy consumption. As earlier mentioned waste recycling is one of the indicator of waste management which we focused on in this study.
- Education on gardening: this is an activity or practice of growing and cultivating plants as part of horticulture. Education on gardening permits learners to get outside and interact with nature, implement lessons taught in class (match theory to practical), grow healthy food an also relieve stress. It has as indicators gardening policies, gardening practices, gardening effects and gardening skill among which we shall focus more on gardening effects.
- Education on green partnership: Partnership is an agreement where parties known as business partners agree to corporate to advance their mutual interests. Among its indicators are Clubs and NGOs.
- Green pedagogic actions: pedagogy is and art or science of teaching and educational methods. The key concept of green pedagogy is to evoke and use emotions in order to prompt action and reflection. It often involves instructional methods as classroom lessons, practical lessons, excursions, sketches among which we shall focus on practical lessons.

4.3.2. Dependent variable

The dependent variable of this study is Sustainable development (SD). SD is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Report 1987). SD refers to achieving economic and social development in ways that do not exhaust a country's natural resources Ashford (1995). Sustainable development respects the limited capacity of an ecosystem to absorb the impact of human activities. This

construct was operationalized with respect to the planned behavior theory (Azjen, 1991), which has the following modalities: attitude (Att), subjective norms (SN), perceived behavioral control (PBC) and intentions (I). SD has 3 indictors concerning the environment which include: protecting life on land, protecting life in water and protecting life in the air. Our focus in this study will be that of protecting life on land. Thus sustainable development will have 4 modalities:

- Attitude: this is a settled way of thinking or feeling about a person, thing or situation something, which affects a person's behavior. According to Ajzen, one's attitude towards a behavior will affect how likely he will perform that behavior. It has as indicator protecting life on land.
- Subjective norms: these are the beliefs that an important person or group of people will approve or support a particular behavior. They are often determined by the perceived social pressure from others pushing an individual to behave in a certain manner and their motivation to comply with those people's views. It has as indicator protecting life on land.
- Perceived behavioral controls: this is the perception of the difficulty of enacting a behavior. The performance of a behavior is influenced by the presence of adequate resources and ability to control barriers to behaviors. The more the resources and fewer the obstacles the individual perceives the greater their behavioral control and the stronger their intension to perform a behavior. It has as indicator protecting life on land.
- Intentions: this is the aim, goal or purpose to exhibit or perform a behavior. They serve as road maps to certain behaviors. It has as indicator protecting life on land.

4.4. Research plan

The above operationalization of variables permits the elaboration of a research plan. In this research plan we shall pair or cross match between the different modalities of the IV and the different modalities of the DV. These different cross match are seen on table 2.

Table 4.1 Research Plan

IV / DV	Attitude (Att)	Subjective norms (SN)	Perceived Behavioral controls (PBC)	Intensions (I)
Waste Management (WM)	WM * Att	WM * SN	WM * PBC	WM * I
Education on Gardening (EG)	EG * Att	EG * SN	EG * PBC	EG * I

Education on Green Partnership (EGP)	EGP * Att	EGP * SN	EGP * PBC	EGP * I
Green Pedagogic actions (GPA)	GPA * Att	GPA * SN	GPA * PBC	GPA * I

Table 1 presents the different cross match between each modality of the IV to each modality of the DV. It has 16 cross match. The grouping of these cross matches permitted us to formulate the specific hypothesis which will be presented in the next section.

4.5. Research Hypothesis

4.5.1. General Hypothesis

The general hypothesis was formulated as such environmental education influences sustainability intension in some selected secondary schools in the Yaoundé VI sub-division in the center Region of Cameroon. Operationalizing this hypothesis resulted to four (4) specific hypothesis.

4.5.2. Specific Hypothesis

H1- Education on waste management influence sustainable development in protecting life on land in some selected secondary schools in the Yaoundé VI sub-division. This hypothesis says that once a child receives education on waste management, he will be able to protect life on land. This first hypothesis consists of 4 hypotheses relative to the sustainable development.

- Education on waste management influences attitudes towards protecting life on land
- Education on waste management influences subjective norms about protecting life on land
- Education on waste management influences perceived behavioral controls relative to protecting life on land
- Education on waste management influences intension in protecting life on land

H2- Education on gardening influences sustainable development in protecting life on land in some selected secondary schools in the Yaoundé VI sub-division. This hypothesis says that once a child receives education on gardening, he will be able to protect life on land. This second hypothesis consist of 4 hypothesis relative to the sustainable development.

- Education on gardening influences attitudes towards protecting life on land
- Education on gardening influences subjective norms about protecting life on land

- Education on gardening influences perceived behavioral controls relative to protecting life on land
- Education on gardening influences intension in protecting life on land

H3- Education on green partnership influences sustainable development in protecting life on land in some selected secondary schools in the Yaoundé VI sub-division. This hypothesis says that once a child receives education on waste management, he will be able to protect life on land. This third hypothesis consist of 4 hypothesis relative to the sustainable development.

- Education on green partnership influences attitudes towards protecting life on land
- Education on green partnership influences subjective norms about protecting life on land
- Education on green partnership influences perceived behavioral controls relative to protecting life on land
- Education on green partnership influences intension in protecting life on land

H4- Green pedagogic actions influences sustainable development in protecting life on land in some selected secondary schools in the Yaoundé VI sub-division. This hypothesis says that once a child receives education on waste management, he will be able to protect life on land. This fourth hypothesis consist of 4 hypothesis relative to the sustainable development.

- Green pedagogic actions influences attitudes towards protecting life on land
- Green pedagogic actions influences subjective norms about protecting life on land
- Green pedagogic actions influences perceived behavioral controls relative to protecting life on land
- Green pedagogic actions influences intension in protecting life on land

4.6. Research Instruments

In this section, our objective is to present the procedures used to collect data, precisely the choice of instrument and its justification, its elaboration, pretest and its validation as well as the procedure of data collection.

4.6.1. Choice and justification of research instruments

In social science in general and in science of education in particular, several tools are used to collect data. These tools include: interview guides, observations, tests, questionnaires, etc. The use of any of these tools by the researcher is a function of the objective and type of research. In this work, we

will use a questionnaire because it presents a certain number of compatibility with our objectives and the nature of variables. The questionnaire seems most adequate in this study because it favors the anonymity of the candidates, gives the possibility to measure many aspects at once and permits easy treatment of data given a large sample size with at a low cost. The questionnaire also permits rapid collection of data within minimum time and the immediate, easy and rapid access to data analysis

(Delhomme & Meyer 2002)

4.6.2. Elaboration of Data collection tool

The questionnaire used in this study was elaborated to collect data from form 3 and 4 students. It consist of 3 main parts beside the introductive section which are: the sociodemographic section, the scale of planned behavior theory permitting to measure sustainable development and the scale of environmental education.

The introduction section drawing the attention of students was thus:

Dear respondent**,**

We are carrying out a research on students' attitude towards the environment and we will like to know your attitude on environmental issues**.** This works aims to study your attitude and behavior towards Environmental protection. All information received remains confidential with the researcher and your privacy shall be appropriately secured in line with article 5 of Cameroon law no 91/023 of December 1991. The questionnaire is designed to collect data strictly for academic purposes. Please answer directly and fully as possible.

- **Sociodemographic factors**

The first section of this questionnaire consist of the sociodemographic characteristics. These characteristics takes in to consideration aspects, which permits us, explain students' ability to participate in sustainable development in protecting life on land. They include information on age, sex, school and class of student.

- **Planned behavior scale measuring SD about protecting life on land**

The second section consist of the planned behavior theory scale which served to measure the attitude, subjective norms , perceived behavioral control and intentions towards protecting life on land. For each dimension, we formulated the items in relation to the protecting life on land. The response given by the participants on these items was based on the Likert scale ranging from 1

(strongly disagree) to 5(strongly agree). The modality attitude consisted of 8 items "Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8" example of items include (*For me protecting life on land is good; For me protecting life on land is pleasant*). The modality subjective norms comprises of 3 item "Q9, Q10, Q11" example of item include (*my teacher thinks that I should protect life on land, my classmates think that I should protect life on land*). The modality perceived behavioral norms consisted of 4 items "Q12, Q13, Q14, Q15" example of items include (*it is possible for me to protect life on land; it is easy for me to protect life on land*). The modality intention consisted of 5 items "Q16, Q17, Q18, Q19, Q20" example of items include (*I intend to protect life on land; I have decided to protect life on land*). The modality protecting life on land has 2 items "Q21, Q22" example of items include (*I protect life on land, I know how to protect life on land*).

- **Personal involvement inventory scale on environmental education**

The personal involvement inventory scale by Zaichkwosky (1985) on environmental education has 13 items divided in to 4 dimensions (waste management, gardening effects, partnership and green pedagogic actions). Waste management aims to measure students' ability to separate and recycle waste in order to protect life on land. This modality consist of 3 items " Q23 , Q24, Q25 ". Example of items include (*I have learnt how to separate waste before throwing (bottle, paper, plastics, batteries), I have learnt how to recycle waste (recycling of bottles, recycling of plastic etc)*. Education of gardening effects aims to measure students aptitude on techniques to effective gardening and ability to put it in practice. This modality has 2 items " Q26, Q27) example of items include (*I am taught practical lessons on gardening, I am taught techniques to effective gardening to improve plants yield*). Education on green partnership aims to measure the influence and contributions of exchange programs to improve students' knowledge on environmental education and SD. This modality has 3 items "Q28, Q29, Q30" example of item include (*My school has environmental clubs to promote collaborative skills and capacity building in students for an ecofriendly environment, My school creates opportunities for NGOs on environment conservation to come educate us on acquiring real life skills in environmental management*). Green pedagogic actions aims to reveal if techniques, which teachers use, promote environmental education. This modality has 5 items "Q31, Q32, Q33, Q34, Q35" example of items include (*Teachers carry out demonstrative lessons on environmental protection, Teachers give us practical assignments on waste management for environmental protection*).

4.6.3. Pretest and validation of instrument

A pretest was done on the 18th of May in GBHS Akono. This was done to 20 form 4 students to test students comprehension on the various questions in the questionnaire. It was important to verify if

the items on environmental education and those of the PBT measuring sustainable development on protecting life on land are comprehensible and are not ambiguous.

The researcher presented the objective of the exercise to the students and the questionnaire was given to those who were willing to participate. This exercise took about 30mins. In the course of answering some students asked some clarification of certain terms used in the questionnaire. These terms were taken note by the researcher and the simpler term, which was given as substitute to the challenging term was immediately replaced in the questionnaire. For example item Q8 (*for me protecting life on land is indispensable*) was corrected to (*for me protecting life on land is essential*). At the end of the exercise, the students refunded the answered questionnaire to the research with excitement of feeling valued.

The Alpha of Cronbach was used to test the internal coherence between the variables. This analysis is a necessary condition to check homogeneity of the scales used. In this study two scales were used.

The analysis of the internal coherence index, permitted us to obtain a satisfactory value of alpha of Cronbach for the 5 dimensions which permit us to measure sustainable development in protecting life on land (α =0,744 for the dimension attitude; α =0,701 for the subjective norms; α =0,772 for the perceived behavioral controls; α =0,760 for intensions and α =0,805 for protecting life on land).

The analysis of the internal coherence index, permitted us to obtain a satisfactory value of alpha of Cronbach for the 4 dimensions of environmental education (α =0,708 for education on waste management; α =0,783 for education on gardening effects; α =0,838 for education on green partnership and α =0,768 for green pedagogic actions).

4.6.4. Procedure of administration of questionnaire

The questionnaire was personally administered by the researcher to the correspondents using the face to face mode to those concerned to get detailed information on environmental issues. This activity took place in the month of May (26^{th}) at GBHS Etouge-ebe and 2^{nd} June at COSBIE Simbock. Administration of questionnaire was done on different days for efficiency sake and also considering the free periods of and availability of students. Prior to data collection, we first took contact with the school administration of read our objective and gave us the authorization to administer the questionnaires. This first contact with the administration also permitted us to have a

view of the timetables of the classes concerned as well as get an appropriate date and time for administration of the questionnaires.

On the day of data collection, the researcher was ushered to the classes concerned (form 3 and 4) by a teacher who introduced the researcher to the student and asked to give in their maximum corporation. The researcher in turned greeted the students and students were given the questionnaires based on the inclusion and exclusion criteria of this study. After this selection, the correspondents were asked to answer the questions as freely as possible following the instructions given in the questionnaire and with no communication amongst each other. The students took about 20 minute to answer the questions, at the end of the exercise, the students were given a word of gratitude for their voluntary participation and collaboration.

4.7. Statistical Tool

There exist several statistical test in social science in general and science of education in particular, but the choice for any research depends on the nature of data collected. Some of these statistical tests include: the Khi square, the student t-test, correlational analysis, regression analysis, multivariance analysis (MANOVA), just to name a few. In this study we chose to use the Pearson correlation and linear regression.

Pearson correlation test is used to determine the relationship between Environmental Education and Sustainability development on protecting life on land. It is given by:

Where x and y are individual samples, x , $\bar{y}$ are means of the samples. Check correct version of this formula.

The linear regression test which goes beyond showing the degree of significance of a relationship between variables, to determine the variable(s) that highly predicts the variations on the dependent variable as compared to others. We will use this test to show the variable(s) that predicts the most amongst education on waste management and recycling, education on ecosystem and gardening, education on green partnership and green pedagogic action. This will allow us to point out the strongest predicting factor of sustainability intensions. This test is expressed follows:

$$\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_p X_p$$

Where β represents a set of coefficients in the sample population whose values are still to be determined.

These tests were used in hypothesis testing in this study where the null hypothesis was tested to verify that a linear relationship can be used to predict values of the dependent variable given values of the predictor variables. Likewise, the SPSS (Statistical Package for the Social Sciences) version 22.

4.8. Difficulties Encountered

The researcher faced a few challenges during the data collection phase among which was getting the schools which will give us access to the students. Next was waiting to get a convenient day and time to meet the students given the saturated nature of their timetable. Aside getting a convenient day, the researcher also had to spend financially to make several turns to these respective schools. Time constraint wasn't left out given that the questionnaire had to be administered before the students go on holidays.

This chapter was consecrated to presenting the methodology used for data collection. This presentation was made on 8 principal points: the area of study and the target population, sample size and technique, the variables, research plan, the hypotheses, research instruments, statistical tool and difficulties encountered on the field. Data collection was done with the aid of a well-structured questionnaire consisting of two scales: the planned behavior theory scale and the personal involvement inventory scale by Zaichkwosky (1985). In spite the difficulties encountered, the data was collected from 200 students form 2 secondary and high school in the Yaoundé VI municipality. The results obtained will be presented in the next chapter.

CHAPTER 5: PRESENTATION OF RESULTS AND DATA ANALYSIS

The previous chapter permitted us to present the methodological procedures which favored the collection of data for this study. The present chapter consist of the data analysis and presentation of results. Two main sections constitute the essence of this chapter: the analysis of the primary factors on one hand and the analysis of the secondary factors on the other hand. The analysis of the secondary factors will be done on the descriptive and inferential aspects. The descriptive statistics will permit us show the central tendencies by the intermediary of a cross match of the demographic factors (sex, age, class, school) with regards to sustainable development in protecting life on land. The inferential aspects will present results on the effect of these different sociodemographic factors on the modalities of sustainable development in protecting life on land (attitude, subjective norm, perceived behavioral controls, intention and protecting life on land). This will be done by the student t- test. The analysis of the primary factors will consist of the verification of our specific hypothesis by the intermediary correlation, which has as objective to verify the link existing between the modalities of environmental education and the modalities of sustainable development in protecting life on land. This will be followed by a regression analysis which will permit us identify the strongest predictor of attitude, subjective norms, perceived behavioral control, intension and protecting life on land.

5.1. Analysis of Secondary Factors

The secondary factors are factors which don't make up the main objective of a research hypothesis. Nevertheless, they give us detail information on the characteristics of the participants as well as permit us to see their effect on the phenomenon under study. In this case of this study, the sociodemographic factors retained are: sex, age, school and class.

5.1.1. Sex and Sustainable development

Table 5.1: Variation of sustainable development in protecting life on land in relation to sex

		Min	Max	Mean	SD	T	*P*
ATT	**Males**	1,0	5,0	4.03	.720	0.93	.351
	Females	1,0	5,0	4.11	.560		
SN	**Males**	1,0	5,0	4.02	.804	1.144	.254
	Females	1,0	5,0	4.16	.846		
PBC	**Males**	1,0	5,0	3.87	,723	0.425	.671
	Females	1,0	5,0	3.83	.732		
INT	**Males**	1,0	5,0	3.71	.749	1.499	.135
	Females	1,0	5,0	3.88	.789		
PLL	**Males**	1,0	5,0	3.43	.933	.905	.367
	Females	1,0	5,0	3.56	1.051		
SD	**Males**	1,0	5,0	3.87	.585	1.162	.247
	Females	1,0	5,0	3.96	.518		

Note. *SD= standard deviation, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development*

The table 2 presents the variations of SD in protecting life on land in relation to sex. It reveals that there is no difference between males and females (Mh= 3.87 = Mf=3.96; t=1.162, p=.247). The absence of a difference is observed at the level of all the modalities of sustainable development. In effect, both men and women see that it is good, important and necessary to protect life on land (Mh = 4.03=Mf = 4.11; t= 0.93, p= . 351). Both males and females think the persons who are important to them protect life on land (Mh= 4.02 =Mf =4.16 ; t=1.144, p= .254). They equally perceive that they are capable of protecting life on land (Mh=3.87 = Mf = 3.83; t=0.425, p= .671). we also observe that both men and women have a mutual intention to protect life on land (Mh=3.71= Mf= 3.88; t=1.499, p= .135). Finally both gender envisage to protect life on land (Mh= 3.43=Mf=3.56; t= 0.905, p= 0.367).

5.1.2. Age and sustainable development

Table 5.2: Variation of sustainable development in protecting life on land in relation to Age

		Min	Max	Mean	SD	T	*P*
ATT	**10-15**	1,0	5,0	4.14	.567	1.835	.068
	16-20	1,0	5,0	3.97	.717		
SN	**10-15**	1,0	5,0	4.12	.840	0.330	.742
	16-20	1,0	5,0	4.08	.823		
PBC	**10-15**	1,0	5,0	3.87	,743	0.904	.367
	16-20	1,0	5,0	3.78	.689		
INT	**10-15**	1,0	5,0	3.79	.758	0.877	.381
	16-20	1,0	5,0	3.89	.814		
PLL	**10-15**	1,0	5,0	3.53	1.044	0.322	0.748
	16-20	1,0	5,0	3.48	.948		
SD	**10-15**	1,0	5,0	3.95	.563	0.814	.417
	16-20	1,0	5,0	3.88	.515		

Note. *SD= standard deviation, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development*

The table 2 presents the variations of SD in protecting life on land in relation to Age of participants. It reveals that there is no difference between participants of age 10-15 and participants of age 16-20 ($M_{age\ 10\text{-}15}$= 3.95 = $M_{age16\text{-}20}$=3.88; t=0.814, p=.417). This tendency is observed at the level of all the modalities of sustainable development. In effect, participants of age 10-15 and participants of age 16-20 see that it is good, important and necessary to protect life on land ($M_{age\ 10\text{-}15}$= 4.14 = $M_{age1620}$=3.97; t=1.835, p=.068). Both participants of age 10-15 and participants of age 16-20 think the persons who are important to them protect life on land ($M_{age\ 10\text{-}15}$= 4.12 = $M_{age16\text{-}20}$=4.08; t=0.330, p=.742). They equally perceive that they are capable of protecting life on land ($M_{age\ 10\text{-}15}$= 3.87 = $M_{age16\text{-}20}$=3.78; t=0.904, p=.367). We also observe that participants of both age range have a mutual intention to protect life on land ($M_{age\ 10\text{-}15}$= 3.79 = $M_{age16\text{-}20}$=3.89; t= 0.877, p=.381). Finally the participants irrespective of the age range envisage to protect life on land ($M_{age\ 10\text{-}15}$= 3.53 = $M_{age1620}$=3.48; t=0.322, p=.748).

5.1.3. School and sustainable development

Table 5.1: Variation of sustainable development in protecting life on land in relation to schools

		Min	Max	Mean	SD	T	*P*
ATT	**GBHS EE**	1,0	5,0	4.05	.673	**2.212**	**.028**
	COSBIE	1,0	5,0	4.17	.520		
SN	**GBHS EE**	1,0	5,0	3.79	1.181	**4.206**	**.000**
	COSBIE	1,0	5,0	4.23	.686		
PBC	**GBHS EE**	1,0	5,0	3.92	.780	0.349	.728
	COSBIE	1,0	5,0	3.86	.737		
INT	**GBHS EE**	1,0	5,0	3.81	.909	0.071	.943
	COSBIE	1,0	5,0	3.78	.695		
PLL	**GBHS EE**	1,0	5,0	3.55	1.263	0.084	0.933
	COSBIE	1,0	5,0	3.52	.952		
SD	**GBHS EE**	1,0	5,0	3.89	.677	1.185	.073
	COSBIE	1,0	5,0	3.97	.513		

Note. *SD= standard deviation, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development, GBHSEE=Government Bilingual High School Etoug-ebe*

The table 5.3 presents the variations of SD in protecting life on land in relation to the schools sampled. It reveals that there is no difference between participants of GBHS EE and COSBIE (M_{GBHSEE}= 3.89 = M_{COSBIE}=3.97; t=1.185, p=.073). This tendency is observed at the level of all the modalities of sustainable development (perceived behavioral Control, intention, protecting life on land). In effect, participants of GBHS EE and COSBIE equally perceive that they are capable of protecting life on land (M_{GBHSEE}= 3.92 = M_{COSBIE}=3.86; t=0.349, p=.728). we also observe that both participants of GBHS EE and COSBIE have a mutual intention to protect life on land (M_{GBHSEE}= 3.81 = M_{COSBIE}=3.78; t=0.071, p=.943). Finally the participants of these schools envisage to protect life on land (M_{GBHSEE}= 3.55 = M_{COSBIE}=3.52; t=0.084, p=.933).

On the contrary concerning the attitude, participants of GBHS EE see that it is good, important and necessary to protect life on land while those of COSBIE think it is much more good, Important and necessary to protect life (M_{GBHSEE}= 4.05 = M_{COSBIE}=4.17; t=2.212, p=.028). Concerning the subjective norms, participants of GBHS EE think the persons who are important to them protect life

on land while those of COSBIE are of the opinion that the persons who are important to them protect life on land much more (M_{GBHSEE}= 3.79 = M_{COSBIE}=4.23; t=4.206, p=.000).

5.1.4. Class and sustainable development

Table 5.4: Variation of sustainable development in protecting life on land in relation to class

		Min	Max	Mean	SD	T	*P*
ATT	**From 3**	1,0	5,0	4.02	.727	1.042	.229
	From 4	1,0	5,0	4.12	.554		
SN	**From 3**	1,0	5,0	3.94	.947	**2.290**	**.023**
	From 4	1,0	5,0	4.21	.738		
PBC	**From 3**	1,0	5,0	3.73	.818	1.779	.077
	From 4	1,0	5,0	3.92	.659		
INT	**From 3**	1,0	5,0	3.79	.873	0.469	.640
	From 4	1,0	5,0	3.84	.716		
PLL	**From 3**	1,0	5,0	3.31	1.103	**2.252**	**0.025**
	From 4	1,0	5,0	3.64	.931		
SD	**From 3**	1,0	5,0	3.83	.616	1.868	.068
	From 4	1,0	5,0	3.98	.492		

Note. *SD= standard deviation, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development*

The table 4 presents the variations of SD in protecting life on land in relation to the class sampled. It reveals that there is no difference between participants of GBHS EE and COSBIE (M_{from3}= 3.83 = M_{from4}=3.98; t=1.868, p=.068). This tendency is observed at the level of all the modalities of sustainable development (Attitude, perceived behavioral Control, intention). In effect, participants of GBHS EE and COSBIE see that it is good, important and necessary to protect life on land (M_{from3}= 4.02 = M_{from4}=4.12; t=1.042, p=.229). Participants of both classes equally perceive that they are capable of protecting life on land (M_{from3}= 3.73 = M_{from4}=3.92; t=1.779, p=.077). We also observe that both participants form3 and form 4 have a mutual intention to protect life on land (M_{from3}= 3.79 = M_{from4}=3.84; t=0.469, p=.640).

On the contrary concerning the subjective norms, participants form3 think the persons who are important to them protect life on land while those of form 4 are of the opinion that the persons who are important to them protect life on land much more (M_{from3}= 3.94 = M_{from4}=4.21; t=2.290,

p=.023). Concerning the protecting life on land, the participants form4 envisage to protect life on land more than those of form3 (M_{from3}= 3.31 = M_{from4}=3.64; t=2.252, p=.025).

This first section had as objective to present results resulting from the analysis of the sociodemographic factors. We observed that, the sex, age, school, class doesn't influence the behavior of the participants with regards to protecting life on land. Nevertheless, we can underline the school and class affects the attitudes, the subjective norms and the behavior of participants relative to protecting life on land. The next section will permit us verify our hypothesis.

5.2. Analysis of Main Factors

The analysis of the main variables have as objective to verify if there exist a link between environmental education and its modalities with sustainable development and its modalities. To this effect, we use the correlation and regression analysis to affirm or reject our hypothesis. The operationalization of the IV permitted us to formulate 4 specific hypotheses. In same light, operationalizing the DV permitted us to formulate 20 specific hypothesis.

5.2.1. Education of waste management and sustainable development

Here we are verifying the first specific hypothesis where education on waste management influences sustainable development in protecting life on land. This verification is equally done at the level of attitude, subjective norms, perceived behavioral control, intention and protecting life on land.

Table 2.5: Matrix of correlation between education of waste management and sustainable development in PLL

	WM	ATT	SN	PBC	INT	PLL	SD
WM	1						
ATT	-,008	1					
SN	, **267***	,439**	1				,
PBC	,083	,353**	,409**	1			
INT	,056	,466**	,392**	,466**	1		
PLL	**,162***	,315**	,332**	,396**	,485**	1	
SD	, **223***	,797**	,672**	,692**	,794**	,621**	1

Note**.** **. The correlation is significant at 0.05 (bilateral), **. The correlation is significant at 0.01 (bilateral), WM= education of waste management, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development*

The table 5 presents a correlation matrix, which matches the different modalities of SD in protecting life on land and education on waste management. It shows that there is link between education on waste management and sustainable development in protecting life on land (r=0.223,

p=0.005). This result indicates that education on waste management positively correlates to sustainable development in protecting life on land. This signifies that the more students are exposed to course on waste management the more they will protect life on land. This is seen at the level of the subjective norms (r=0.267, p=0.015) and PLL (r=0.162; p=0.025) and it signifies that the more student have courses on waste management the more the think that those important to them protect life on land and they protect life on land.

On the contrary, there is no link between education on waste management and attitude (r=-0.008, ns), subjective norms ((r=0.111, ns), PBC (r=0.083, ns), intension (r=0.056, ns).

Table 5.6: Result of the regression between education on waste management and SD in PLL

R=,223 ; R-Square=,050 ; R-Square adjusted=,040 ; Std. Error of the Estimate=,41509 ; F=5, 067; P=,027

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		A	Std. Error	Beta		
1	(Constant)	2,356	,361		6,521	,000
	WM	,268	,119	,223	2,251	,027

a. Variable dépendante : SD

The table 7 presents the regression of education on waste management on sustainable development in protecting life on land. This results reveal that the model is significant (**F=5, 067 P=,027**) and explains 5% of the variance of sustainable development in protecting life on land (R^2=0.050). This signifies that when students are educated on waste management it has a positive impact on sustainable development in protecting life on land (β=0, 223; p= 0, 027).

5.2.2. Education on gardening effect and sustainable development

Here we are verifying the second specific hypothesis where education on gardening effect influences sustainable development in protecting life on land. This verification is equally done at the level of attitude, subjective norms, perceived behavioral control, intention and protecting life on land.

Table 5.7: Matrix of correlation between education on gardening effect and sustainable development in PLL

	EG	ATT	SN	PBC	INT	PLL	SD
EG	1						
ATT	,047	1					
SN	,041	,439**	1				,
PBC	**,197****	,353**	,409**	1	,		
INT	**,206****	,466**	,392**	,466**	1		
PLL	**,170***	,315**	,332**	,396**	,485**	1	
SD	**,171***	,797**	,672**	,692**	,794**	,621**	1

Note**.** **. The correlation is significant at 0.05 (bilateral), **. The correlation is significant at 0.01 (bilateral), EG= education on gardening effect, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development*

The table 6 presents a correlation matrix, which matches the different modalities of SD in protecting life on land and education on gardening effects. It reveals that there is a weak and positive correlation between education on gardening effects and sustainable development in protecting life on land (r=0.171; p=0.016) and PBC (r=-0.197; p=0.005), intensions (r=0.206; p=0.003), PLL (r=0.170; p=0.016). These results permit us to do a regression given that most of the correlations are significant. On the other hand, we observed that there is no link between education on gardening effects and the attitude (r=0.047, ns), subjective norms (r=0.041, ns).

Table 5.7: Result of the regression between education of gardening effect and SD in PLL

R=,171 ; R-Square=,029 ; R-Square adjusted=,024 ; Std. Error of the Estimate=,53895 ; F=5, 953; P=,016

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		A	Std. Error	Beta		
1	(Constant)	3,700	,101		36,625	,000
	EG	,077	,032	,171	2,440	,016

a. Variable dépendante : SD

The table 7 presents the regression of education on gardening effects on sustainable development in protecting life on land. This results reveals that the model is significant **(F=5, 953; P=,016)** and explains 2.9% of the variance of sustainable development in protecting life on land (R^2 =0.029). This

signifies that when students are educated on effects of gardening to the environment in has a positive impact on sustainable development in protecting life on land (=0, 171; p=0,016).

5.2.3. Partnership and sustainable development

Here we are verifying the third specific hypothesis where education of green partnership influences sustainable development in protecting life on land. This verification is equally done at the level of attitude, subjective norms, perceived behavioral control, intention and protecting life on land.

Table 5.8: Matrix of correlation between education on gardening effect and sustainable development in PLL

	EGP	ATT	SN	PBC	INT	PLL	SD
EGP	1						
ATT	-,097	1					
SN	-,047	,439**	1				
PBC	,035	,353**	,409**	1	,		
INT	,112	,466**	,392**	,466**	1		
PLL	**,139***	,315**	,332**	,396**	,485**	1	
SD	,018	,797**	,672**	,692**	,794**	,621**	1

Note**.** **. The correlation is significant at 0.05 (bilateral), **. The correlation is significant at 0.01 (bilateral), EGP= education on green partnership, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development*

The table 8 presents a correlation matrix, which matches the different modalities of SD in protecting life on land and education on green partnership. It shows that there is no link between education on green partnership and sustainable development in protecting life on land (r=0.018, ns) and the attitude (r=-0.097, ns), subjective norms ((r=-0.047, ns), PBC (r=0.035, ns), intension (r=0.112, ns). On the contrary, we observe a positive and weak correlation between education on green partnership and protecting life on land (r=0.139; p =0.049). These results do not permit us to do a regression because most of the correlations are not significant.

5.2.4. Green pedagogic and sustainable development

Here we are verifying the third specific hypothesis where green pedagogic action influences sustainable development in protecting life on land. This verification is equally done at the level of attitude, subjective norms, perceived behavioral control, intention and protecting life on land.

Table 5.9: Matrix of correlation between education on green pedagogic actions and sustainable development in PLL

	GPA	ATT	SN	PBC	INT	PLL	SD
GPA	1						
ATT	-,060	1					
SN	-,011	,439**	1				
PBC	,006	,353**	,409**	1			
INT	,004	,466**	,392**	,466**	1		
PLL	,071	,315**	,332**	,396**	,485**	1	
SD	-,013	,797**	,672**	,692**	,794**	,621**	1

Note**.** **. The correlation is significant at 0.05 (bilateral), **. The correlation is significant at 0.01 (bilateral), GPA= green pedagogic actions, Att=attitude; SN= subjective norms; PBC=perceived behavioral control; INT=intention; PLL= protecting life on land; SD= sustainable development*

The table 9 presents a correlation matrix, which match the different modalities of SD in protecting life on land and green pedagogic actions. It seems that there is no link between green pedagogic actions and sustainable development in protecting life on land (r=-0.013, ns) and the attitude (r=0.060, ns), subjective norms ((r=-0.011, ns), PBC (r=0.006, ns), intension (r=0.004, ns), PLL (r=0.071, ns).

Table 5.3: Result of the regression between modalities of EE and SD in PLL

R=,210 ; R-Square=,044 ; R- Square adjusted =,025 ; Error of the Estimate=,53888 ; F=2, 251; P=,065

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		A	Std. Error	Beta		
1	(Constant)	3,767			29,020	,000
	WM	,152	,130		2,454	,016
	EG	,099	,062	,226	2,671	,008
			,037	,217		
	EGP	-,020	,036	-,046	-,562	,575
	GPA	-,045	,035	-,109	-1,311	,192

a. Variable dépendante : SD

The table 10 presents the model of the general regression of the modalities of environmental education on sustainable development in protecting life on land. It shows that this model is not

significant (F=2, 251; P=,065) **.** This signifies that environmental education is not sufficient to bring students to protect life on land. Nevertheless, looking at the detail analysis, the results reveal that, the best predictor is education on gardening effects (= 2.671; p= 0.008).

At the end of this fifth chapter which consisted of the presentation and analysis of data, it reveals that environmental education, doesn't influence sustainable development in protecting life on land. This analysis was done in two sections: the first section was the analysis of secondary factors and the second section on the analysis of the primary factors. The first revealed that the sex and age are associated to the attitudes with respect to protecting life on land, to the subjective norms relative to the protecting of life on land and the protection of life on land. The second section revealed that education on gardening effects is the best predictor of sustainable development in protecting life on land.

CHAPTER 6: DISCUSSION OF MAIN FINDING

The preceding chapter presents data and analyses the results of our findings from the statistical treatment (Correlation and regression). These results are a point of discussion, which is the objective of this chapter. This entails explaining the results obtained from the 2nd and 3rd chapter. This chapter will be divided into two man sections. The first will focus on discussing the results obtained from the demographic factors while the second will focus on discussing the results obtained from our main factors.

6.1. Discussion of results obtained from the sociodemographic factors

Four main sociodemographic factors were the object of analysis in this study. These include age, sex, class and school. This first section is consecrated to explain the results obtain between these different respective factors in protecting life on land.

6.1.1. Sex and sustainable development in protecting life on land

The results reveal that sex does not have any effect on individual's behavior in relation to protecting life on land (Mm=3.87; Mf= 3.96; t= 1. 162, p= .247). The absence of a difference is equally observed at the level of all the modalities of sustainable development in protecting life on land. This signifies that, both males and females in same classes in the respective schools, think that they are capable to protect life on land. These results can be explained in that the participants are in same respective classes and schools, as such they receive the same education. The result of having the same teachings seem to represent a norm which give of an expected uniform attitude. In effect, according to Mvessomba (2012), the role of a norm is to converge or orientate the behavior of individuals towards a certain uniformity. These result go against the sense of Sargisson et al (2020) research on sex and proenvironmental behavior for sustainability, where sex was weakly significant.

6.1.2. Age and sustainable development in protecting life on land

The results equally reveal that Age does not have any effect on individual's behavior in relation to protecting life on land ($M_{age\ 10\text{-}15}$ =3.95; $M_{age\ 10\text{-}15}$ = 3.88; t= 0. 814, p= .417). The absence of a

difference is equally observed at the level of all the modalities of sustainable development in protecting life on land. This signifies that the participants, irrespective of their age think that, they are capable of protecting life on land. These results can be understood in the sense that all our participants are in the adolescent age phase. According to Elking (1967), the most individuals in the adolescence phase are characterized by their perception of being unique, of being almighty. These different characteristics give an adolescent the ace of being capable of realizing the expected behavior with respect to sustainable development. These result go against the sense of Otto &Kaiser (2014); Wiernik et al., (2013) research on age and SD who say that older people are more committed to nature its care and conservation for sustainability purposes.

6.1.2. School and sustainable development in protecting life on land

The results reveal that school variation does not influence individual's behavior in relation to protecting life on land (M_{GBHSEE} =3.92; M_{COSBIE} = 3.97; t= 1.185, p= .073). This tendency is observed at the level of perceived behavior and intension in protecting life on land. This signifies that the participant form both schools, present similar behaviors linked to sustainable development. This result can explained with the fact that the participants of both schools are located in the same context and a relatively close neighborhood. In same light, the participant are all from the Anglophone subsystem of education which put an accent of practical implantation, this being a peculiarity of all schools in the Anglophone subsystem of education, favors the development of identical behaviors linked to the protection of the environment.

Nonetheless, we observe a difference between at the level of attitudes and subjective norms between the participants of the two schools. This difference can be due to the fact that one school is of the private sector while the other is of the public sector. In effect, in private schools, there is a stronger influence of implantation and the obligation of obtaining of good results. This is generally not the case in public schools. Also the social background of the students do influence the attitude and subjective norms, generally students from relatively rich homes will have the tendency of protecting life on land more given the influence from their parents unlike those from relatively poor homes. Reason for the difference is seen in the sense that public schools have a bigger blend of participants from poor and averagely rich homes while the private sector has a higher percentage of participants from relatively rich homes given the tuition fee.

6.1.2. Class and sustainable development in protecting life on land

The results equally reveal that class does not have any effect on individual's behavior in relation to protecting life on land (M_{form3} =3.83; $M_{form\ 4}$ = 3.98; t= 1.868, p= .068). The absence of a difference

is seen at the level of the attitude, perceived behavioral controls and intension. This signifies that the participants of both classes consider the protection of life on land to be important, see that it is easy to protect life on land and express their will to protect life on land in the future. These results go in same sense with Garber (2014) research on educational level and sustainable attitude who says increase in knowledge alone is not enough to have sustainable behaviours. Our results can be understood in same as earlier mentioned above, the Anglophone subsystem of education emphasizes on practical implementations, this can be a factor of good performance as far as protecting life on land is concerned.

Nevertheless, we observe a difference at the level of subjective norms and the modality protecting life on land. This difference especially at the level of protecting life on land is as a result of the fact that the program on environmental education is different in the two classes. This is normal or obvious that students in a higher class of education should be more performance than those in a lower class. This is also seen in Dirks & Orvis (2005) results which presents that students exposed information on environmental practices such as gardening achieve more advanced knowledge and more positive gains in specific performance. So is the case of the results revealing form 4 students to be more able to protect life that the form 3 students.

In the first section of his chapter, we have presented some explanations to the results obtained from the analyses of the sociodemographic factors (sex, age, school and class) and sustainable development in protecting life on land. The explanation put forward are in relation to the characteristics of adolescents, the context, the adherence to the Anglophone subsystem, and the social class. The next section will focus on the analysis of the main factors.

6.2. Discussion of results obtained from the main factors

In this section, we will discuss the results relative to the main factors. It revolves around 4 main specific hypothesis of this study. These hypotheses will be discuss in relation of empirical studies and theories.

6.2.1. Education on waste management and sustainable development

The first specific hypothesis of this work was formulated as such: Education on waste management influences sustainable development in protecting life on land. This hypothesis had as objective, to study the impact of education on waste management on sustainable development in protecting life on land specifically on the level of attitudes, subjective norms, perceived behavioral controls and intensions. The result obtained reveal that education on waste management influences sustainable development in protecting life on land($r=0.223$, $p=0.005$). This result indicates that education on

waste management positively correlates to sustainable development in protecting life on land. This significance is seen at the level of subjective norms (r=0.267, p=0.015) and PLL (r=0.162; p= 0.025). These results accepts this hypothesis in the light that education on waste management does correlate with the different dimensions of sustainable development link in protecting life on land. These results go contrary to that of Ifegbesan, Ayodeji (2010) which shows that the secondary school students from the sampled zones were aware of waste problems on their school compounds, but possessed poor waste management practices. In terms of change of attitude and perception towards management of waste in urban centers, Eneji, et al, (2016) found that most residents of urban centers have very negative attitude towards waste management and disposal, this is so because most persons throw away waste careless in the open, dump in open spaces, throw them into gutter or drainages, and some just discard them anyhow.

A possible explanation of this result, seem to reside in level of the influence of the physical and social environment and the context. In effect, the participants of this study live in a physical environment, which favours the implementation of pro environmental behaviors. This is further explained by the presence of aspects of waste management in the course work and some implementation of policies in Cameroon on Waste management. This norms result due to the fact that the people who are important to our participants manifest positive attitudes relative to the protection of the environment. It is possible to observe that teachers, parents and class mates of our participants make efforts not to liter dirt. This is line up to the various teaching or education given to the participants. This is evident in that these participants receive and have the knowledge on waste management but do practice it due to the social influence, which favors this attitude. This is also evident in the research study of Ali et al (2022) whose result show that education on waste management and specifically education on waste recycling have an influence on the attitude of students in protecting life on land for sustainability purposes.

6.2.2. Education on gardening effects and sustainable development

The second specific hypothesis of this work was formulated as such: Education on gardening effects influences sustainable development in protecting life on land. This hypothesis had as objective, to study the impact of education on gardening effect on sustainable development in protecting life on land specifically on the level of attitudes, subjective norms, perceived behavioral controls and intensions. The result obtained reveal that education on gardening effect correlate with sustainable development in protecting life on land (r=0.171; p=0.016) as well as perceived behavioral control

(r=0.197; p=0.005), intention (r=0.206; p=0.003) and protecting life on land (r=0.170; p=0.016). This show that the participants who have received education on gardening effect see themselves capable of protecting life on land, have the intention of protecting life on land and put into practice the behavior linked to protecting life on land. This will permit them contribute to sustainable development. The pertinence of the prediction model and the significant correlation observed between gardening effect and sustainable development permit us to affirm this hypothesis. This result align with that of Childs (2011);Fisher-Maltese and Zimmerman, 2015; Kos and Jerman (2019); Waliczek and Zajicek, (1999) and Dirks & Orvis (2005) who have also confirmed that school gardens can positively affect students pro environmental attitudes and knowledge to protect life on land. Our results also allign to that of Rodríguez Marín et al. (2021) and ChipantizaMasabanda et al. (2021) who attest education on gardening effects to promote sustainable environmental education.

A possible explanation of this result reside in the planned behavior theory (Ajzen, 1991). In effect, this theory postulates that intention is the best predictor of one's behavior, which in turn is predicted by close and distant factors. The close factors, which influence intention, are the subjective norms, the perceived behavioral controls and the attitudes while the distant factors concern the sociodemographic factors, education and beliefs. There therefore exist a link between distant factors, close factors and Intention. This suggests that, there is an indirect relationship between education on gardening effect and intention which bring out the role of education in predicting behavior. Several research such as that of Erharbor et al. (2016) align with this remark (put authors who shoe that EE influences SD).

6.2.3. Education on green partnership and sustainable development

The third specific hypothesis of this work was formulated as such: Education on green partnership influences sustainable development in protecting life on land. This hypothesis had as objective, to study the impact of education on green partnership on sustainable development in protecting life on land specifically on the level of attitudes, subjective norms, perceived behavioral controls and intensions. The result obtained reveal that education on green partnership does not influence sustainable development in protecting life on land. This is also seen at the level of the modalities attitude, subjective norms, perceived behavioral controls and intentions. These results reject this hypothesis in the light that education on green partnership does not correlate with the different dimensions of sustainable development link in protecting life on land. This result align with that of Calderon-Madero et al. (2019) who mention that there is a lack of knowledge in educational institutions about School Environmental Projects-PRAE in the educational policies in Columbia,

throughout the institutions and above all little administrative support for the implementation of this, therefore, activities related to environmental issues lag behind natural science knowledge areas.

A possible explanation of this result seem to be in relation with the scarcity of partners on the environment in schools and the weak frequency of manifestations of activities link to the environment. Concerning the scarcity of partners on the environment, we realized an absence of frequent signing partnership deeds between school administrators and bodies on environmental conservation. This omission contribute to the absence of sensitization activities on the environment in schools, " Journees porte ouverts" and poor practices in schools on environmental protection. In effect, these different shortcomings could have reinforced the pro-environmental behaviors in the participants towards the environment. We realize the presence of some manifestations only on days like work environment day, biodiversity day and wildlife conservation day. Even though these events are always celebrated, much attention is not given to it and their impact isn't quite visible. In same light most environmental clubs, if present have as leader student who do not have a good mastery of environmental protection and there is no budget attributed to finance the functioning of such clubs.

6.2.4. Education on green pedagogic actions and sustainable development

The fourth specific hypothesis of this work was formulated as such: Education on green pedagogic actions influences sustainable development in protecting life on land. This hypothesis had as objective, to study the impact of education on green pedagogic actions on sustainable development in protecting life on land specifically on the level of attitudes, subjective norms, perceived behavioral controls and intensions. The result obtained reveal that green pedagogic actions does not influence sustainable development in protecting life on land. This is also seen at the level of the modalities attitude, subjective norms, perceived behavioral controls and intentions. These results reject this hypothesis in the light that green pedagogic actions does not correlate with the different dimensions of sustainable development link in protecting life on land. This results go contrary to that of Ann & Christine (2021) who stipulate that green pedagogy approach achieves sustainability competencies through a controlled appeal to the emotions and explicit uncovering of learner values to take on new ideas and new perspectives in more sustainable directions. Our study also contradicts that of Yeşilyurt et al. (2020) whose result reveal that students who received environmental education, draw pictures enthusiastically and reflect an increase in environmental awareness, and developed awareness for caring for the environment, empathizing with nature and drawing aesthetically highly appreciated images.

A possible explanation of this result seem to be in relation with the poor implementation of teaching pedagogies such and carrying out demonstrative lessons, not given students practical tasks to carryout at home. Added to this, some schools do not have the required didactics materials and infrastructure such as laboratories. Obstacles such as lack of training (Santos-Junior & Fischer, 2020) in environmental pedagogies shows difficulty in putting it into practice, especially due to the lack of training, support from institutions and involvement of the school community in environmental issues. In turn, Bezeljak et al. 2020 present that, participants present a good knowledge of environmental education; however, they lack understanding of the interconnections between the environmental part, economic and social dimensions related to sustainable development. Farfan et al. 2021 work on environmental education in educational institutions reveal that, authors agree that environmental education aims to achieve sustainable development. Ardoin et al. 2018 also report that EE appears to be highly successful at meeting knowledge and competency outcomes though EE programs are not quite as successful at achieving outcomes involving dispositions and behavior due to the actual implementation of EE programs or result from practical difficulties.

The last chapter of this work is consecrated to the discussion of the results from the analyses of the primary and secondary factors. We have given possible explanations to the relation established between the sociodemographic factors (sex, age, class, school) and sustainable development in protecting life on land. We also presented possible explanations of the results gotten from our four hypothesis. The results of the correlation and regression permitted us to decide on the various hypothesis. It reveal that just one hypothesis the four formulated is accepted (H2). The explanations given for these results were made with reference to our theories: the planned behavioral theory and the triple bottom line theory and empirical studies.

GENERAL CONCLUSION

The adaptation of ecology and environmental education from their establishment on our planet earth, have been surrounded by very good intentions on the part of the managers, researchers and senior teachers in education. In the governance of companies producing goods and services there have been established norms and/or laws that in many of the cases are not sufficient to prevent environmental pollution. This will bring about a modification in relationships of production, socio-economic structures and cultural patterns, which embraces the individual and the collective with the intention that present and future generations change the way they live, to encourage members of contemporary industrial society in a new, historic and global environmental context.

Therefore, the philosophy must bring people and society face the challenge of managing a culture that supports the construction and reconstruction of environmental thought. To think environmentally will then be to assume the task of a new type of thinking that harmonizes all of nature (fauna, flora), including productive people and processes for a planet earth that is full environmental

The Earth could actually support billions more people, assuming those people were making sound choices around resource production and consumption. Environmental education should be given due attention due to the constantly evolving the world climate and world climate change that is getting warmer. This thing we need to do in school is not just to give the lessons to students but we make it work through the reforestation activities in the school, we not only fix the infrastructure but also create the condition of the school environment that is green and beautiful so that students can learn with cool conditions and make students able to think clearly, and ready to compete strongly in the global world as entrepreneurs. Save the world... Go green

As a result, the main objective of this study was to assess the impact of environmental education on sustainable development in protecting life on land in some selected secondary schools in the Yaoundé VI sub-division of the center Region of Cameroon, in order to make suggestions as to how school environmental education can be made more effective. Based on this, four Environmental Education Variables; Education on waste management, Education on gardening, Education on green partnership and Green pedagogic actions, were investigated on how they influence sustainable development in protecting life on land. The general hypothesis was

formulated as such environmental education influences sustainability intension in some selected secondary schools in the Yaoundé VI subdivision in the center Region of Cameroon.

This piece of work was divided into six main chapters: Chapter one also referred to as the problematic is the fundamental chapter of the study as it presents the principal elements that make up the foundation of this study; Chapter two focused on the review of existing works on the variables of the study carried out by different authors and researchers. It equally reviewed some relevant information on the concept; Chapter 3 discussed in some depth the theories and model behind environmental education for sustainability; Chapter 4 was principally based on the research methodology where we presented the study population and the instruments used in collecting and analyzing data; Chapter 5 focused on data analysis and presentation of results, where the analysis of the primary factors on one hand and the analysis of the secondary factors was done; Chapter 6 presented data and analyzed the results of our findings from the statistical treatment (Correlation and regression). Results reveal that education on waste management($r=0.162$; $p=0.022$) shows a weak correlation with protecting life on land with the value while education on gardening ($r=0.171$; $p=0.016$) and education on green partnership ($r=0.139$; $p=0.049$) reveals a weak and positive correlation while education of green pedagogic actions ($r=0.071$, ns) show no significant relation with sustainable development in protecting life on land The confirmation of the second hypothesis signifies that when students are educated on effects of gardening to the environment in has a positive impact on sustainable development in protecting life on land. This led to the conclusion that Environmental Education plays a major role towards ensuring sustainable development in protecting life on land thus environmental education should be implemented in schools to improve the quality of education for sustainable development

To further the research, some suggestions are put forward to educational stakeholders of the Yaoundé VI sub-division in the Centre Region of Cameroon and as well as those of the secondary education at Macro, meso and micro levels, on how to tackle and ameliorate the problems of Sustainability Intensions and how to effectively and efficiently maximize the available resources, methods, approaches, strategies to plan, structure and incorporate Environmental education in Secondary school curriculum as a teaching subject in order to achieve sustainability intensions and development which will in turn permit students to be autonomous and employable and also be able to contribute to the economic, social, and political stability of the country while preserving a planet for tomorrow.

From all indications, it can be seen that one's perception or analysis cannot be sufficient enough to address a problem, and given the fact that research is continuous, it is therefore expected of the researcher to provide an open gate for further research to be carried out in;

- This study can be carried out in this field but with a different population and different state or private secondary schools or educational institutions in Cameroon.
- Other researchers can also investigate the problem with larger sample size and doing a longitudinal study of the selected sample.
- Researchers may also want to look at developing and transforming the Cameroon secondary educational system to focus on achieving true sustainability in the society.

▪ **Macro level**

- State policies should effectively implement EE for sustainable development in secondary school curriculum
- Provide the necessary infrastructural disposition for the teaching if this subject
- There should be creation of youth sustainable development programs, Environmental workshops and clubs
- Create and establish partnership kind with or national and international institutions and organizations practicing and encouraging sustainable development. Partnership programs such as Youth for Sustainable Development and the Geneva 2030 Ecosystem. The **Youth for Sustainable Development** addresses the needs of a target group and provide them with an opportunity to feed into the program development. The Geneva 2030 Ecosystem is a multistakeholder initiative that mobilizes the capacity, skills, experience, ideas and motivation of Geneva-based actors towards realizing the 2030 Agenda.
- Training teachers to specialize on this Field

▪ **Meso level**

- Ministries of education (basic, secondary and higher) ensure the implementation of sustainable development as a teaching subject.
- The Ministry of Secondary education is encouraged to launch competitions and small grants for community innovations by students that promote sustainability.
- Educational inspectors should draw up the teaching syllabus spelling out practical application of the sustainable development teaching syllabuses in school.
- Focus on educational and learning dimensions of sustainable development

- Focus on Innovative development of new and creative solutions to common problems - Support evaluation in terms of innovation, success and sustainability.

▪ **Micro level**

- Teachers should establish an adapted teaching pedagogical method with the required didactic material
- Educators should also look for ways of strengthening voluntarism amongst student communities and amongst out-of-school youth groups, as well as amongst school children where appropriate.

The following Challenges were encountered by the researcher in the course of this study

- The researcher had to make several visits to the regional delegation of Secondary education in Yaoundé to access some necessary statistics.
- Due to the current pandemic (covid-19), it was difficult for the researcher to interview some key participants in her study, which delayed the progress of the work.
- Most of the graduates were unwilling to answer the questionnaire, and the researcher had to plead and explain the vitality of their collaboration in the study. This delayed the progress of the research.

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ANNEXES

REPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie
****
UNIVERSITE DE YAOUNDE I
****
FACULTE DES SCIENCES DE L'EDUCATION
****

Peace – Work – Fatherland
****
UNIVERSITY OF YAOUNDE I
****
FACULTY OF SCIENCES OF EDUCATION
****

Student questionnaire

Dear Respondent,

REPUBLIC OF CAMEROON

We are carrying out a research on students' attitude towards the environment and we will like to know your attitude on environmental issues**.** This works aims to study your attitude and behaviour towards Environmental protection. All information received remains confidential with the researcher and your privacy shall be appropriately secured in line with article 5 of Cameroon law no 91/023 of December 1991. The questionnaire is designed to collect data strictly for academic purposes. Please answer directly and fully as possible.

SECTION A:

Demographic Information

Fill in the appropriate information

Age: 10-15 ☐ 16-20 ☐

Sex: Male ☐ Female ☐

School: GBHS Etougebe ☐ QIS TKC

Class: Form 3 ☐ Form 4 ☐

SECTION B:

This section aims to assess your level of involvement in environmental issues. Please tick (■) in the box corresponding to your most preferred respond, the scale ranges from 1 to 5 with 1 of lowest value (Strongly disagree) and 5 the highest value(Strongly agree).

Sustainable development (DV)

S/N	Statements	Responses				
Attitudes		**1**	**2**	**3**	**4**	**5**
1	For me protecting life on land is good					
2	For me protecting life on land is pleasant					
3	For me protecting life on land is useful					
4	For me protecting life on land is important					
5	For me protecting life on land is enjoyable					
6	For me protecting life on land is desirable					
7	For me protecting life on land is wise					
8	For me protecting life on land is indispensable					

Subjective norms		**1**	**2**	**3**	**4**	**5**
1	My teacher thinks that I should protect life on land					
2	My classmates think that I should protect life on land					
3	My parents think that I should protect life on land					

Perceived behavior		**1**	**2**	**3**	**4**	**5**
1	It is possible for me to protect life on land					
2	It is easy for me to protect life on land					
3	I am able to protect life on land					
4	I can protect life on land					

Intention		**1**	**2**	**3**	**4**	**5**
1	I intend to protect life on land					
2	I have decided to protect life on land					
3	I am determined to protect life on land					
4	I plan to protect life on land					
5	I will protect life on land					

Protecting life on land		**1**	**2**	**3**	**4**	**5**
1	I protect life on land					
2	I know how to protect life on land					

SECTION C

Environmental Education (IV)

	Waste management and recycling	1	2	3	4	5
1	I have learnt how to separate waste before throwing (bottle, paper, plastics, batteries)					
2	I have learnt how to recycle waste (recycling of bottles, recycling of plastic etc)					
3	I have learnt how to use my organic waste as manure to improve soil fertility					

SECTION D

	Education on gardening affects	1	2	3	4	5
1	I am taught practical lessons on gardening					
2	I am taught techniques to effective gardening to improve plants yield					

SECTION E

	Education on green partnership	1	2	3	4	5
1	My school has environmental clubs to promote collaborative skills and capacity building in students for an eco friendly environment					
2	My school entertains interschool collaboration for environmental awareness and management					
3	My school creates opportunities for NGOs on environment conservation to come educate us on acquiring real life skills in environmental management					

SECTION F

S/N	Statements	1	2	3	4	5
	Green Pedagogic Actions					
1	Teachers carry out demonstrative lessons on environmental protection					
2	Teachers explain to us how to protect out environment					
3	Teachers give us specific instructions on waste management to eliminate environmental pollution					
4	Teachers ask us questions to evaluate our knowledge on environmental protection					
5	Teachers give us practical assignments on waste management for environmental protection					

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