BIODIVERSITY CONSERVATION AND ECOSYSTEM MANAGEMENT: IMPLICATION FOR SUSTAINABLE DEVELOPMENT IN SUB-SAHARAN AFRICA

[1]Bamigboye, E.O. and [2]Bamigboye, R.A.
[1]Department of Agricultural Extension and Rural Development,
Obafemi Awolowo University, Ile-Ife, Osun State. Nigeria.
[2]Natural History Museum (Botany unit) Obafemi Awolowo University, Ile-Ife, Osun state. Nigeria.

Abstract
This paper has attempted to discuss biodiversity, ecosystem management and indigenous knowledge system (IKS) approaches to sustainable biodiversity and ecosystem management. It specifically identifies various indigenous knowledge and ecosystem management strategies employed in an integrated approach to biodiversity and ecosystem management by all stakeholders (local farmers, governmental and non-governmental organizations) to preserve the biodiversity and ecosystem in order to adapt to a global threat "global warming and warning" It also has reports of some factors that are associated with the utilization of IKS for biodiversity conservation by farmers. The article further presents a model on the interrelationship between biodiversity, ecosystem management and IKS. The current global campaign for the conservation of biodiversity with low-external input technologies could help to stem environmental degradation. It has also informed the emphases on the ecosystem management strategies in order to achieve sustainable development and economic growth in Sub-Saharan Africa.
Keywords: Sub-Saharan Africa, Local knowledge, Sustainable development, Natural resources, ecosystem and conservation.

INTRODUCTION

Since man learnt to appreciate his environment (to till the soil, built a tent in order to seek for comfort, indirectly there has been a steady decline in the natural resource base (Idoga *et. al*, 2004). The importance of biodiversity cannot be over emphasized. It plays great roles in the nation's economy and capacity for food production. Biodiversity is critical to the maintenance of a healthy environment. Biodiversity is the variability among living organisms from all sources including inter-alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part (FEPA, 2005; SEP, 2007).

This is particularly true in the tropical environment especially in Sub-Saharan Africa. Wilson, (1998) outlined some of the factors responsible for the depletion of forest quality and productivity in the tropics to include unfavorable climate especially high temperature and low rainfall intensity which culminated into seasonal wild fire. In addition is the increased population density and over exploitation of the forest production without involving in culture of replanting. The rate of biodiversity loss has been accelerating rapidly throughout the industrial era as a result of the tremendous benefits of biodiversity and ecological consequences of its losses, urgent attention is needed more than ever before to biodiversity conservation.

It is estimated that between 25 and 40 percent of the original cover of Nigeria forest was lost by 1980, about 380,000 hectares of both forest and savannah vegetation cover are deforested annually (Ayuba, 2004).The overall effect of biodiversity and ecosystem depletion is that Nigeria for example in 1997 had well over 60 million hectare of forest and woodlands, currently has only about 9.6 million hectares of forest reserves. The extent of vegetation depletion in SSA varies from one place to another. In some areas, the battle to restore depleted land has been lost, while in other

areas reversing vegetation depletion will prove slower, costly and difficult to achieve.

There is a serious concern over the consequences of unchecked vegetation depletion to the sustainable national development. An assessment by convention and biological diversity (CBD) concluded that without conservation measures, the world's current forest and cropland as a whole would be reduced and the attendant impact will be biodiversity loses and probably permanent extinction. That is why this present study attempts to look into biodiversity conservation and ecosystem management and its implication for sustainable development. In order to achieve sustainable biodiversity conservation these three approaches must be fully integrated into environmental conservation (biodiversity conservation, ecosystem management and local knowledge approaches).

It has been shown (Chamber, 1991) that local knowledge are expressed in different aspect of human endeavor and they include knowledge about the environment, natural resource conservation, farming practices, ethno veterinary therapy, experiment and biological folk taxonomies or systems of classification. It has been widely acknowledged that local people have their own body of knowledge used in solving various problems that confront them in managing their environment before the advent of the western science. (Agboola, 2005; Bamigboye and Kuponiyi, 2010) acclaimed that indigenous knowledge people has been very relevant and effective in research and development. The richness of the knowledge must be maximally explored and utilized by all agents of development.

According to Shepherd (1998), one of the technical principles of sustainable development is cherishing and understanding indigenous knowledge about the local people and natural resource management. Local knowledge on genetical resources acquired through technical know-how, experiments, borrowing of ideas and inheritance over the millenniums if harnessed through problem identification and technology generation can contribute immensely to biodiversity conservation which will help in sustainable environmental protection in the sub-Saharan Africa.

Biological diversity in Africa, and many other parts of the world, is experiencing serious threat of decline and extinction. This is manifested by the reduced viability, endangerment and extinction of several species and communities of plants and animals, and by the breakdown in the functioning of ecosystems. Biodiversity loss may not directly affect humans but indirectly, the effects of losing many species as well as the diversity of ecosystem in general are great when biodiversity is lost, the environment loses many species that provide valuable and unique roles to the ecosystem. Biodiversity loss also means that humans are losing animals that could have served as biological control agents and plants that could potentially provide higher yielding crop varieties, pharmaceutical drugs to cure existing or future diseases (e.g. cancer) and new resistant crop varieties for agricultural species susceptible to pesticides resistance in sects or virulent strains of fungi, viruses and bacteria (Primack, 2006).

The Problematic

Today, the earth is so polluted that the very survival of humanity is threatened as evidenced by silent emergencies like desertification, fast degradation of arable land due to abusive and inappropriate use of fertilizers, polluted rivers, air and soil caused by industrial effluents (Eyong *et. al,* 2004). All these activities have helped to speed up the process of biodiversity loss. The loudest emergency the world has to deal with is global warming but so far coping mechanisms for safeguarding our common future remain inadequate. The life support systems of the earth (seas, rivers, oceans soils, forests and air) can be likened to a boat; any leakage on one part of this boat will cause the entire boat and not only the affected part. Co-operation at all levels by all including indigenous peoples with

differing knowledge systems, is needed to protect the earth's life support systems and to meet present development needs whilst keeping in mind those of future generations need. The idea is to transfer enough natural capital to future generations. Hence, capital bequest is an intergenerational contract for sustainability based on ethics because so far no strong legal framework exists to hold deviants accountable for their actions. Protection of the earth's life support systems requires all sorts of knowledge and coherent information. The absence of this explains why imported western models and technologies have failed in alien settings. The so called 'experts' should try to understand the people they intended to help and should take indigenous knowledge and perceptions into consideration rather than denigrate and relegate them to the background in development interventions.

Objectives of the article

The general objective of this article is to shed light on the integration of biodiversity conservation techniques, ecosystem management and local knowledge with possible adaptation to sustainable development. The specific objectives are to identify the local knowledge approaches to biodiversity conservation and designing a model to explain the integrated approaches to the three concepts.

Definition of concepts

Local knowledge: Local knowledge and its strategic importance, which have been seen as 'a powerful asset that many developing countries possess' cannot in any way be underestimated, particularly now that development professionals have begun to appreciate its contributory roles in sustainable development (Kolawole, 2005). It has been acknowledged that '……development is no longer the exclusive domain of western (global) knowledge' (Von Liebenstein, 2001). Another school of thought refers to what indigenous people know and do, and what they have known and done for generations –practices that evolved through trial and error and proved flexible enough to cope with change (Melchias, 2001). This definition draws our attention to the colonial racist idea that indigenous knowledge is a monopoly of trials and error while western (modern) knowledge is science characterized by experimentation.c432

Sustainable development

Sustainable development on its own part is a fluid concept that is relatively new in the e development discourse. It was first mentioned in the work of Leister Brown (1981), and six years later the Brundtland Commission defined it as "development that meets the needs of the present generation without compromising the ability of future generations to meet theirs" (WCSD, 1987:8). Such a political definition fails to give concrete sustainability benchmarks. Despite more than half a century of development cooperation, very little has been achieved because the donor community thought sustainable.

A practical definition of sustainable development should contextually take into consideration issues of cooperation, stakeholder participation, commitment, long, medium and short term effects of current actions, common concerns, inter and intra generational equity, justice, and moderate production and consumption habits. It requires efficient communication, tacit knowledge and its transfer between and within generations, capacity and willingness to act based on the knowledge available

Conservation

Conservation means a carefully planned management of the natural resources within the environme with a view to ensuring their sustained availability over a long period of time. Conservation according to Fatubarin, 2006 may involve investigating, protecting, repairing, maximizing the use of natural resources and upgrading the use of natural resources. Biodiversity is an important resource for Nigerian people. Some of its

uses are for consumption (food, fibre, fuel, shelter, medicine, wild life trade) and non-consumptive (ecosystem services and the economically important tourism industry). Considering the heavy dependence on natural resources in the country, many cities, communities and villages are vulnerable to biodiversity loss which could be aggravated by climate change.

Biodiversity

Biodiversity is used in describing the diverse plants and animals of a country or region. The plants and animals constitute the bulk of the biota of the natural ecosystem of all countries of the world. They make up the renewable natural resources within the environment of the ecosystem. The natural resources are soil, water and the importance of biodiversity is similar to the overall importance of the diverse plants and animals living in a place.

Benefits include: food vegetables, fruits, meat, income / revenue, clothing, medicinal drugs, educational materials paper, pencils, recreation-sports, horse, fishing, tourist centres -zoological garden reserves sanctuaries reserves and source of fuel.

Biodiversity ensures the essential ecological functions on which life depends, including supplies of clean water, nutrient cycling, and soil maintenance. Biological diversity (or biodiversity) embraces the totality of different forms of life (plants, animals and micro-organisms, including the genetic variability within individual species) and of ecosystems. The convention on biological diversity defines biological diversity as *"the variability among living organisms from all sources, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."*

Ecosystem management

The terms 'conservation of biological diversity' and 'nature conservation or nature management' are used often synonymously. Biodiversity conservation includes the protection and sustainable exploitation of natural resources and the management of the genetic diversity of both wild and domesticated species. (SEP, 2007). Nature management involves the protection, regeneration and development of both the living and non-living nature. Both terms imply the integration of biological objectives into other sectors. 'Conservation' embraces the ideas both protection and sustainable use while 'preservation' is closer in meaning to protection. 'Protection' is used for saving specific components of the biological diversity, in particular regions and species in reserves and national parks or by means of special measures. In the Convention on Biological Diversity, the term 'sustainable use' was defined as "the use of components of biological resources, thereby maintaining its potential to meet the needs and aspirations of the present and future generations.

In situ conservation

In situ biodiversity conservation refers to the management of ecosystems and species in their natural habitats, varying from strictly protected areas (such as national parks and nature reserves) in which a whole range of uses are not permitted, to natural areas which are traditionally managed and utilized by the local population or in semi-natural ecosystems, e.g. cultivated areas, managed for the conservation of genetic diversity on farm. In situ conservation includes the maintenance and recovery of viable populations of species in their natural environment, and in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties. A habitat means a place or type of site where an organism naturally occurs.

Ex situ conservation

A part of the biological diversity can be stored up elsewhere outside their natural environment (ex situ), for example in

botanical gardens, zoos, seed and gene banks and other man-made cultures. This is important, particularly for agriculture and biotechnology. Ex situ conservation results in impoverishment of the genetic diversity and evolutionary processes are halted. Ex situ conservation is complementary and offers additional certainly in situations in which 'in situ' conservation is uncertain.

Protected areas

The conservation of natural ecosystems is the most effective means of maintaining as large as possible a range of biological diversity. A significant part of the natural biological diversity must be conserved in protected areas. These are geographically defined areas which are designated, regulated and managed to achieve specific conservation objectives which vary from no human use to controlled exploitation.

IUCN in 1993 Categorizes Protected Areas into five

Category I Strict Nature Reserve/Wilderness Area: protected area managed for scientific purposes.

Category II National Park: protected area managed for ecosystem protection and recreation.

Category III Natural Monument/Natural Landmark: protected area, mainly managed for the conservation of a specific natural phenomenon.

Category IV Habitat and Species Management Area: protected area mainly managed for conservation.

Category V Protected Landscape/Seascape: protected area mainly managed for the conservation of a landscape.

Category V Managed Resource Protected Area: protected area mainly managed for the sustainable use of natural resources.

Principal functions of biodiversity

Scholars like Cooper (1992), Reid (1992) and McNeely (1994) have been able to establish four principal functions of biodiversity in environmental conservation viz a viz: *Information functions.* Inherent in biological diversity is the information contained in the vast profusion and complexity of flora, fauna, ecosystems and processes. The millions of plant and animal species on earth each have their own unique genetic composition. The majority of species are still unknown. So far, some 1.7 million plant and animal species have described. Estimates of the total number of species differ widely; the world conservation monitoring centre estimates the total to be about 12.5 million.

Regulatory functions. The regulatory functions relate to the maintenance of processes within ecosystems. The vegetation on slopes regulates moisture levels and prevents erosion the so-called screening function; mangrove swamps are important swamping grounds for fish. In an ecosystem there is a balance between the different species due to grazing, competition and predation. In man-made ecosystems, diversity of species (for example of soil organisms) contributes to balances between crops, biotic and a biotic factor.

Support functions. Every type of organism belongs to a specific community of plants and animals live: Savannah-lands for antelopes and livestock, coral reefs for many species of fish, forests for numerous plant and animal species. If the demands placed by plants, animals or man on the carrying capacity of these life support systems are too great or if the ecosystems are harmed, diversity declines. Individual plant and animal species also have a support function (for example cattle for certain insects, trees for insects, epiphytes and creepers).

Productive functions. Production and consumption is taking place continuously at all levels. Organisms use products to survive. When man uses these products, it is often at expense of his fellow organisms.

BIOLOGICAL DIVERSITY AS A BASIC FORM OF SUSTAINABLE DEVELOPEMNT

Agenda 21, a global plan of action that was adopted at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro urges that development at both national and international level should be guided by the principle of 'sustainable development', as defined by the Brundtland Commission: "Sustainable development is development that meets the needs of their own needs."

A prerequisite for economic and ecological sustainability is the maintenance of biological diversity for human needs, both consumptive and non-consumptive, as well as for its intrinsic values. The main functions of biological diversity have already been stated to be: the production function, the regulatory function, the support function and the information function. This means that biological diversity forms the basis of sustainable development. Ecological sustainability can only be achieved by a careful evaluation of the relative importance of the functions of the functions concerned and by satisfying the ecological conditions for their conservation.

The fight against poverty, which is the first priority in development operation, is closely related to economic development, to the maintenance of the means of subsistence, and to an equitable sharing of the environmental space. With the wide range of uses which it provides, biological diversity means diversity in basic supplies and the spreading of risks for many people in developing countries. Of crucial importance, finally, are the still largely unknown functions and future uses of nature. The conservation of biological diversity therefore means keeping options open for future generations. Biological diversity forms an essential element of the common heritage of present and future generations in developing countries, and is therefore an integral component of sustainable development (common heritage of human being).

INDIGENOUS KNOWLEDGE AS ONE OF THE HOLSTIC APPROACH FOR SUSTAINABLE DEVELOPMENT

Every society has a history behind her knowledge resources, which guides its development process. Time passage and contact with others affect knowledge systems as well as a society's development. African IKS are holistic in nature and has centuries of tight bonds with an environment, produces a deep understanding and not snap shots of the inter-relationships among the different elements of a habitat. Doctored and undoctored surveys show that they perform well in risk avoidance and management, ecosystem maintenance and human health. They have linkages and guidelines for social equity, relationships with non-human beings, ecological responsibility and respect for the super-natural. Environmental changes are best countered by diversified indigenous survival strategy help to ensure cultural and biological diversity since the global annual world market profits of medicines derived from plants is estimated at over 43 billion US dollars but sadly enough, indigenous people receive only 0.001 percent of this amount (Melchias, 2001).

Examples of Biodiversity Conservation, Ecosystem Management and Indigenous Conservation Techniques in the study area

Field survey and internet browsing revealed the examples of traditional practices of biodiversity conservation in Sub-Saharan Africa. The Korup National Park area in Cameroon uncovered through formal and informal interviews with numbers of a relocated village between 1999 and 2006. The belief is that traditional and folk methods of conservation work better than

forced relocation (Eyong *et al.,* 2004). These methods include:

a) Hunting Habits: Hunters are cautious that not too many people hunt in one area at the same time for safety reasons. Hunters respect areas for trapping reserved for them in the forest since hunting with guns is considered to be dangerous when too many hunters act too near to each other in the same forest. Hunters try to avoid young animals and pregnant ones because they are not yet big enough to be eaten or sold. Such common sense habits are positive contributions and need to be encouraged. In the rainy season, hunting with guns is restricted and only minimal trapping is carried out. These attitudes are seen to be positive for the animal population since there is limited disturbance in the forest over a period of about six months.

b) Sacred Forests: The existence of restricted areas or sacred forests makes certain sections of forest to be declared as sacred. For example… as the elders at Itapa in Ekiti state of Nigeria conducted researchers to Igbotapa sacred forest where women that died mysteriously are usually buried (maternal death during child delivery). Also, Ile-Ife (the cradles of the Yorubas) separated a large acreage of land for the keeping of local ammunitions and where the Obas normally consulted their ancestors, the name of the sacred forest is called Ile-Odua which is about 500 meters to the ancient palace and strangers are not allowed to enter lest they are used as breakfast. There were also numerous personal taboos and men mostly do not adhere to food taboos. Some men may not eat specific animals because of membership in a traditional association. These taboos coupled with the fact that hunting is a risky venture which also serves for conservation purpose.

c) Cultivation Habits: Forest dwellers grow fruit trees on their farms and around the village. In this way, harvest is more effective. The way the villagers collect and harvest non-timber forest products (NTFPs), like nuts and fruits, are not damaging to the plants. Generally, farm sizes are small (on average, less than one hectare per household) because the people cultivate to meet their domestic needs and not for sale. This implies that only a very small social surplus may be generated.

d) Control of Foreign Exploiters: Local people in the Korup forest of Cameroon have been granting access to foreigners, especially from neighboring Nigeria, in exchange for a token and as a sign of brotherliness. This attitude changed due to the general feeling that free access was exchanged for kickbacks. Youth groups regularly monitor and report to village councils about the presence of foreign exploiters. Women lamented that game guards cannot effectively keep away Nigerian poachers due to their limited knowledge of the entire boundaries of the park, footpaths and their relatively small numbers. With the relatively low prices paid for forest products at source, the villagers have to exploit more in order to make enough money to meet their educational and health needs.

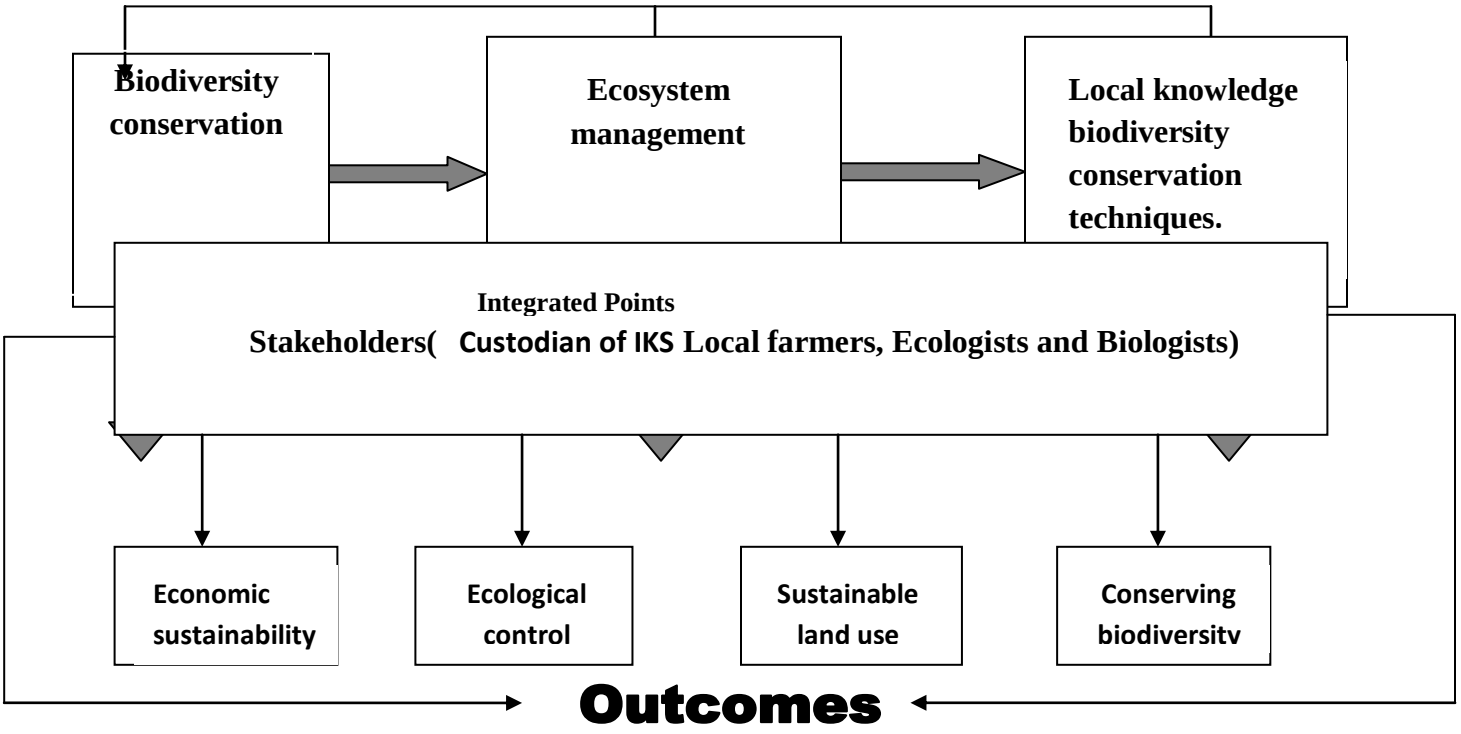
e) Food Taboos: Respect of food taboos is a cultural ritual that binds members and is crucial for the smooth functioning of society. Ill-health is in most instances associated with non-respect of a taboo, causing ancestors to be angry and to punish the victim by inflicting some mystical pain or ailment. Serious cleansing ceremonies are often performed to heal the sick. Today, the youth especially find no reason to respect taboos since they did not become sick after eating a forbidden food. This group forms the most highly educated segment of the village. Most tabooed animals are totems and when owners of these totems die, the animal in the forest dies. Killing these animals during hunting is very difficult and a mystery. Christianity is denying the respect for taboos as sacred society membership is no longer compulsory. Pregnant women do

not eat certain types of snakes, chicken in the company of men, duikers, etc. Some do not eat chimpanzees, eggs, elephant, fox, leopard, dog, pig, etc domestic animal. Pregnant women did not eat liver, alligator or duikers because this might stop production of breast milk. Still, other women do not eat certain animals like bush baby, fox, animal parts like the head of a pig, deer, or even a tortoise, because they are believed to cause foetal abortions. There were also numerous personal taboos and men mostly do not adhere to food taboos. Some men may not eat specific animals because of membership in a traditional association. These taboos coupled with the fact that hunting is a risky venture are good for conservation.

f) Knowledge of Forest and its Resources: The people of Korup in Cameroon have a great knowledge of different plants and animals in their forest. They rely on leaves, roots and barks of trees for medicines, animals for food and cash income and other forest products. Hunters have been integrated in bio-monitoring surveys carried out by independent researchers for the Korup Project. A good example is the discovery of the medicinal vine, shown to be active against the HIV/AIDS virus. A joint team of local healers and a research student collected medicinal plants from the forest. In an open meeting, each healer described the symptoms that each plant can cure. The vine was later tested in the laboratory and discovered to be effective against the replication of the HIV/AIDS virus. However, the publications of this discovery make no mention of the input of local healers. Conversations with the people also revealed a sound knowledge of tourist sites in the park. Pigmy communities in Central African Republic have also realized that current levels of hunting are not sustainable, and so they are helping to reduce pressures by supporting the establishment of a no-hunting zone in the Dzanga-Ndoki area. This move helps to reduce threats from *bushmeat* hunting, an activity largely sustained by outsiders working with logging companies and diamond mines. In return, the Ba'Aka are employed by a Project agency as tourist guides, sharing their understanding of the forest with foreign tourists.

Through a revenue-generating mechanism, 40 percent of all tourist receipts go to a village association, including the Ba'Aka people, while 50 per cent pays the salaries of local employees of the park and reserve. In this way, 90 per cent of the conservation dividend goes to the local people most affected by the park and reserve as compensation for their knowledge.

Model for integrated approaches to sustainable biodiversity and ecosystem management.



Model developed by the authors showing linkages between biodiversity conservation, ecosystem management and local knowledge utilization for sustainable development.

Operationalization of the model

This model will form a frame work or building block on which policies that centre on biodiversity conservation, ecosystem management and local knowledge approaches to sustainable development in different context could be built. Custodians of local knowledge, stakeholders, ecologists, biologists, development workers, other relevant government agencies, policy makers are seen as major stakeholders in this process. See fig 1.

The ecosystem approach which served as a tool to sustainable development is viewed as a subset of a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.

This approach is based on the application of appropriate scientific methodologies focused on level of biological organization, which encompass the essential structures, processes, functions and interactions among organisms and this depends on the interplay between the local people and their environment.

Conclusion and Recommendations

Local knowledge of Sub-Saharan Africa has a potential for ensuring its biodiversity conservation and ecosystem management for sustainable development. This paper presents local knowledge practices that are in use in the study area. While these systems are treated as having a high sustainability potential in the region, this paper was silenced on the utilization of scientific knowledge in biodiversity conservation because some of the imported knowledge cannot fix in to the cultural believe systems and environmental management system. Reengineering of local authorities, development cooperation policy-makers, natural resources managers,

and stakeholders in their epic attempt will help to ensure sustainable environmental protection. Revitalization means social re-engineering to make traditional institutions of governance participatory, revolving on community-based knowledge management schemes with more equitable access to and control over knowledge production, sharing and application. NGOs, which have been effective instruments of people's participation, facilitators and catalysts in development, must start by learning from what local people already know. It is therefore recommended that developing countries need financial support to institutionalize and operate all identify ecosystem strategies in order to achieve sustainable development in SSA. The available biodiversity must be preserved to avoid biodiversity looses. Government, especially (SSA) needs to build up capacity in order biodiversity and manage any potential risk in order to serve our ecosystem from going into extinction.

References

Agboola, A.O. (2005): "Socio-economic assessment of farmers' usage of indigenous and non-indigenous pest control technologies in Cocoa agro-ecosystems of Ondo and Osun states, Nigeria". unpublished PhD thesis. Department of Agricultural Extension and Rural sociology,

Ayuba, S. A. (2004). A review of Land Degradation and Soil Conservation in Nigeria. Proceeding of the National Conference on the IKS and Development. pp205.

Bamigboye E.O. and Kuponiyi F.A. (2010). The characteristics of indigenous knowledge systems (IKS) influence their use in rice production by farmers in Ekiti state, Nigeria. Agricultural Journal 5(2) 74-79, 2010, Medwell Journal, ISSN, 1816-9155

Chamber, R. (1991). Scientists resource-poor farmer-whose knowledge counts. In: Proceedings of a seminarZXCXV on crop protection for Resource –poor farmers.pp1-14.

Cooper, D. (I992). Growing Diversity: Genetics Resources and Local food security, Intermediate technology publications, London.

Eyong, C.O. and Burgess A.O. (2004). Conservation and management of biodiversity proceeding of MAB UNESCO workshop.

Fatubarin, A. (2006). Applied Biology. Keynotes Publishers Ltd. 122pp.

Obafemi awolowo University, Ile-Ife, p227.

Federal Environmental Protection Agency (FEPA) (2005). National Biodiversity Strategy and action plan.Shepherd, G. (1988). Managing Africa's Dry Forest: A review of Indigenous Methods. London: Leister Brown (1981). Sustainability and the role of Biodiversity: The Impact of Anthropogenic Activities. Journal for Sustainable Development in Africa. P 70-88

Oversea Development Institute (ODI).

Idoga, S. M. O. Obasi and H .I. Usman (2004). A review of Indigeneous methods of Soil Conservation. A Proceeding of the National Conference on Indigeneous Knowledge and Development. pp107

International Union for Conservation of Nature IUCN (1993): Categorization of Protected Areas Kolawole, O.D. (2004). Rural communities and indigenous knowledge systems in a changing world: Soil fertility conservation practices amongst farmers. *The Anthropologist 6 (4):283-288.*

MC Neely, J. (1990). Conserving the World's Biological Diversity. The World Bank, IUCN, World Resources Institute,Conservational International and Word Wild life Fund.

Primack, N.O. (2006). Causes of Biodiversity strategy and Action Plan Production for Federal Environmental Protection agency.

Reid, W. (1992). Genetic Resources and sustainable Agriculture. Bio-policy International 2: ACTS Press.

SEP (2007). Stanford Encyclopedia of Philosophy. Accessed on 25th April, 2011.

Tamale, E.S. (1999). Threats to biodiversity and the underlying causes of biodiversity losses in a text biodiversity and gender for sustainable development (eds: Rogers W'O Okot-Uma and RoseMarie-Rita Odiachi.

Von Liebenstein, G. 2001. Linking local and global wisdom. ***Indigenous knowledge and Development Monitor 9 (3): 40***