

## **BIODIVERSITY: A SECURITY FOR THE POOR**

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### **Abstract**

The increasing loss of biodiversity, which is beneficial to a privileged few, leaving the majority poor, is of great concern. It is as a result of this that this paper attempts to explore the concept of biodiversity, highlight some basic importance of biodiversity especially to the poor. It is noted that people rely on a wide range of products gathered from the wild. These products constitute both subsistence and commercial importance to rural people, local, national and international organizations. In other words, the need to manage biodiversity so as to protect the most vulnerable (the poor), who have no alternative assets to keep them from falling further into poverty in the face of losses. Domestication of wild species and breeding new varieties to cope with new conditions and changing needs are some techniques that ensure risk reduction. It is vital however that those people who live with biodiversity, and whose behaviour influences the conservation or destruction of biological diversity, receive from the benefits of biodiversity in order to support its conservation and sustainability.

### **Introduction**

Biodiversity and conservation are two separate, but commonly-linked concepts. It is important to separate them when considering biodiversity in a development context. Conservation refers to a set of objectives, or management activities, designed to maintain population of genes, species and areas of ecosystems. Biodiversity, on the other hand, provides: the raw material for evolution, breeding programmes and genetic technology; the wealth of species that supply products for subsistence, trade and cultural artifacts; and the ecosystem processes and functions that support productive landscapes. Biodiversity can be conserved, used, or destroyed.

A misconception about biodiversity arises because we commonly refer to components of biodiversity (e.g. timber resources; staple crops; indigenous fish, etc.) as natural resources. In regarding them as natural, and of immediate and visible use, we normally forget that they are also part of biodiversity (the living part of the environment). The role of these natural resources within ecosystems is of critical importance to maintaining the health of the environment.

The world is losing its biodiversity at an increasingly alarming rate. This loss is usually of benefit to a few powerful actors, but deprives a greater proportion of the human populace of the natural capital, which is the foundation of their livelihoods. The link between biodiversity and poverty are complex and somewhat circular and interwoven as loss of biodiversity can lead to increased poverty; similarly, poverty can also be an underlying cause of loss of biological diversity. It is therefore the aim of this paper to explore the term biodiversity; highlight the importance of biodiversity most especially to the poor; reflect on the methods of biodiversity; evaluate biological diversity; and as well emphasise the need for proper management in order to safeguard the livelihood of the poor majority whose survival depends heavily on it.

### **Exploring the Concept of Biodiversity**

The term 'biodiversity' came into being in 1980s (Wilson, 1988), and there is still much misunderstanding about what it means. It is common for people to think of spectacular large mammals such as elephants in the thick Congo forest or a big fish such as the whale in the Atlantic Ocean. While such animals and fishes are actually components of biodiversity, the concept is much more, that is less easily seen, less obviously interesting to humans, and yet very crucial for human development (IUCN, 2001). Biodiversity is a short form of biological diversity, and for all life forms on earth. It comprises the plants and animals that we can see, as well as the microscopic organisms that live in the soil, the bacteria in our digestive tracts, and the various biological processes that sustain life on earth.

In order to understand the term clearly, it is best considered in its various perspectives. This may include: its composition, structure and function; the information it holds; its energy and mass; various combinations of human and natural capital; the goods and services it provides; its spiritual and religious importance; and the options it represents for the future.

Biodiversity therefore, could be seen as the variability among living organisms from all sources, including 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.

Diversity within species (genetic biodiversity) refers to the frequency and variety of genes within and between populations of the same species. Genetic biodiversity is for example reflected in differences in the heights of adult coconut plants, the colour of beans varieties, the yields of poultry varieties etc.

A common characteristic associated with genetic biodiversity is the capacity to evolve. Evolution occurs through adaptation in response to natural selection, or artificial selection in the case of human directed breeding. Another key feature of genetic biodiversity is the vast amount of molecular information held in species 'genepools'. This information is the product of millions of years of evolution, and has been drawn on by plants and animal breeders, and more recently genetic engineers, to develop desired characteristics in populations. Any loss of genetic biodiversity is permanent (IUCN, 2001).

Diversity between species (species diversity): This refers to a combined measure of the number of species and the number of individuals in a species (abundance); species number alone is termed species richness. A species is defined as a group of organisms that are able to inter-breed freely, and species biodiversity incorporates characteristics such as size and structure, population dynamics and reproductive cycles, behaviour patterns and taxonomic differences.

The current best estimate of the number of species on earth is 13 million (Heywood and Watson, 1995), of which over 70 per cent are tiny animals without backbones. From a developmental perspective, a number of species' qualities need to be kept in mind. These qualities may include: whether they are pathogens or disease vectors; if they have subsistence, commercial, social or cultural values; are they migratory or endemic to a restricted area; whether they are abundant and capable of recovering quickly from harvesting. These biological qualities need to be added to quantitative measures of species number and abundance when species biodiversity is assessed.

Diversity of ecosystems: This refers to the variety within and between different ecosystems. An ecosystem is a dynamic complex of plant, animal and microorganism communities and their nonliving environment, interacting as a functional unit. Within ecosystems, biological processes such as pollination, predation and symbiosis fulfill important functions. Interactions between living and nonliving components are essential in providing ecosystem services: for instance, soil formation, nutrient recycling and water purification.

Human beings have long been a component of ecosystems, and the interplay between biological processes and human impacts have shaped each other, giving rise to productive landscapes that combine biological and cultural diversity.

### **Importance of Biodiversity to the Poor**

In order to understand and appreciate the importance of biodiversity for human development, there is need to evaluate the products that can be used (both species and genes), and the ecosystem services that support human development. An accurate valuation would require that a consideration be given to direct use values (products), and indirect use values (services), and combined consumption and non-consumption use. The value of biodiversity components that are not used needs also to be taken into consideration in any biodiversity accounting process, (See Fig. 1).

People rely on a wide range of products including domesticated crops, livestock, fish and trees, and products gathered from the fallows and wild lands. It is estimated that roughly 80 per cent of the rural population in Africa depend to some extent on products harvested from the wild, taking one recent example, a study on household resource use in Zimbabwe between 1994 and 1997, shows that wild products provided 37 per cent of total income of rural households in one area. Moreover, poorer sections of the community depended far more on these wild products than richer groups. The products provided 40 per cent of the income of the poorest 20 per cent of the community, whereas the

richest 10 per cent of people derived only 29 per cent of the income from these sources (Cavendish, 2000).

Food security is one major problem that poses a burden to the poor. 'The nutritional quality of foods is an important aspect of food security. In fishponds in northern-Bangladesh, for example, recent experiments have shown that the introduction of small indigenous species of fish (once called "weed fish") can play an important role in improving the nutrition of poor communities. One particular species, locally called mola, has high concentrations of vitamin A in and around the eyes, and because it is eaten whole also provides calcium. Thus, by introducing this indigenous fish into carp fishponds, high yields of animal protein, vitamin A and calcium can all be provided. Termites, an insect that comes out during the rains in the tropics is another very rich source of protein from the wild for many cultures in Africa.

In addition to their subsistence value, wild species are also of commercial importance to rural people (who, in most cases constitute the poor) and local, national and international companies. For example, research shows that forest products from tropical zones contribute 10 per cent of GDP in 18 countries of Africa. Worldwide, tropical countries contribute 25 per cent of the international timber trade of over US \$330 billion annually (IUCN, 2001); this figure however precludes many traded products and domestically consumed timber.

Non-timber forest products are also of economic significance. Bush meat, periwinkle, and snail revenues for example, are very important mostly to the rural poor in Nigeria. Throughout west and central Africa, as well as Latin America: some 370, 000 monkeys are killed annually for trade and local consumption (Robinson and Redford, 1991; Ntiamoa-Baidu, 1997). Specialist sport hunting can also be an important source of income, with trophy hunting fees in Tanzania, Zimbabwe and Namibia ranging from US \$3.6 to 6 million a year (Wilkie and Carpenter, 1999; Chardonnet et al, 1995).

Fish captured annually from the sea and inland waters amount to 94 million tonnes (FAO, 1998) and provide 75 per cent of the primary source of animal protein for over one billion people worldwide. As usual, most of the catches made by local people most especially in Nigeria and in West Africa as a whole, is never included in the computation.

On a wider scope, groups on the margins of the market economy depend on biodiversity products freely gathered from the wild lands or fallows, and cultivated on-farm. Yet these common property resources are often overlooked and undervalued in national and international accounting systems. Where biodiversity is not managed, losses can make poor groups poorer and even more vulnerable to shocks and stresses.

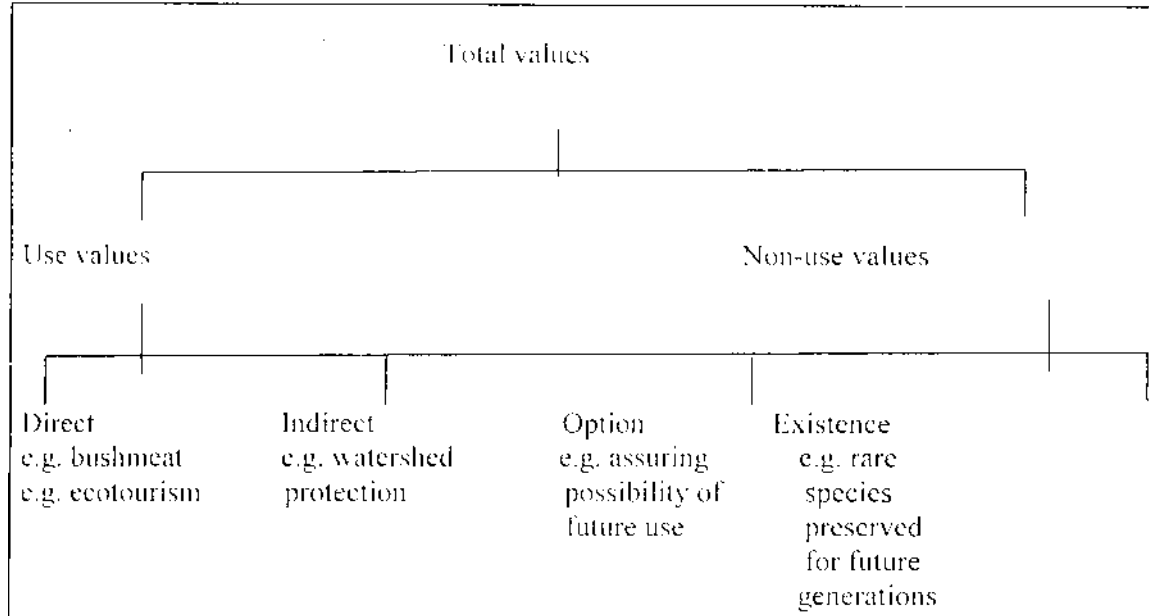
Furthermore, external shocks, such as the collapse of market prices for export crops, droughts or floods, new pests or diseases, hit hardest at the poor, who have little or no financial reserves or credit to fall back on. Wild biodiversity can provide a 'safely net'. In one area of dry-land India, for example, the rural poor normally derive 14-23 per cent of their income from wild products; in times of drought this rises to as much as 57 per cent (Jodha, 1986). The genetic diversity of crops and livestock may also buffer the poor against shocks such as crop failure.

Any assessment of the importance of biodiversity however must consider the requirements and values of different stakeholders who will assign different values according to their needs, and the availability and demand for biodiversity products.

It is also important to recognize that biodiversity is valuable in ways that cannot be measured in purely monetary terms. Biodiversity has religious and cultural significance that may make a sacred forest, for example, priceless to a particular community. The intrinsic worth of biodiversity is enough for some people to live it untouched and recognize its existence value.

A second form of non-use value relates to future options for use. Since we cannot be certain how our needs will change, we cannot say with certainty when we will need biodiversity components in the future, however irrelevant those components may seem today. Therefore keeping them for potential future use, by present or future generations, is an important value (Fig. 1).

**Figure 1- Total Economic Value of Biodiversity (with Examples)**



**Source:** Adapted from Pearce and Morgan, 1994(in Biodiversity in Development: Strategic Approach).

### **Cost of Biodiversity Loss**

The consequences of losing biodiversity vary according to the stakeholder in question. For rural people who rely on gathering foods from the wild, the loss of an area of wild land has immediate and often dramatic impact. For an urban dweller, the immediate consequence of clearing a wetland for farming may not be noticed in the short-term, in the medium-to long-term, water supplies to the urban center may be disrupted. The consequence to a schoolteacher in Awka (Anambra State) of the decline in a species of bee as a result of pesticide application may be negligible, but to the owner of a commercial farm at Isi-Uzo (Enugu State) whose crop was pollinated by the bee, the losses are likely to be considerable.

In any case, loss of biodiversity is worst for people with no alternative assets to protect them from falling into poverty; and this class of people is the poor itself. There is therefore the need for managing biodiversity in order to protect the most vulnerable (the poor).

### **Biodiversity Management Techniques that Care for the Poor**

'file biodiversity management that has contributed most to human development is the domestication of wild species (plants, mammals, birds, fish, insects and even micro-organisms) as crops and stock. Selection and breeding programmes have focused on only the most useful and productive species, breeds and varieties. For instance, around 7,000 plant species have been recorded as food and agricultural crops from an estimated 270,000 higher plant species. Only four crops (wheat, sugarcane and maize) account for 63 per cent of the world's plant derived calorie intake (FAO, 1996). Over half of all timber plantations comprise trees from just four genera: Pinus, Eucalyptus, Acacia and Tectona (FAO, 1999). Of the 4,763 mammals and 9,946 bird species on earth, about 40 have been domesticated and, of these, only 14 account for more than 90 per cent of the world's livestock production (FAO, 1998). While domesticated fish provide 25 per cent of the fish we eat and are also used to produce fishmeal and oil (FAO, 1998). Four carp species (silver, grass, common and bighead) account for more than one-third of world aquaculture production. Similarly, commercial butterfly farming and silkworm production relies on a tiny fraction of the 120,000 or more butterfly and moth species to choose from.

Human development therefore rests on the apex of a biodiversity pyramid, with a few species, breeds or varieties being used intensively and many others

undomesticated or little used. This domesticated component of biodiversity is a product of human selection, and often depends on human

knowledge, technology and management to survive, and its careful management is important to keep options alive for future development.

Breeding new varieties to cope with new' conditions and changing needs is one way to reducing risks. Because high technology, high-input solutions are out of reach for the poor (small- scale farmers), risk is managed by using a number of genetically distinct varieties of each crop, livestock or fish species. Such varieties are adapted to local conditions and possess the genetic variation to allow on-going adaptation. For example, 98 shifting-cultivators households in Sierra Leone were using 59 different rice varieties with four to eight varieties in each Field (Thrupp et al, 1997). This practice provides for security against any crop failure.

To give more idea of genetic-biodiversity, the population of some wild species has provided genetic material that conferred resistance to infectious diseases in domestic species. As reported by Coldfield (1984), wild coffee has provided genetic material to resist fungus infection among domestic species. Also, in the highlands of central Asia, semen from wild yaks has improved the productivity of domesticated yak populations (Blench, 2001). Similarly, in many instances in the West African sub- region, kitten produced by domestic female cats that are impregnated by wild males seem to possess some better-developed physical features (size and shape) than those from domestic male and female intercourse.

Both genetic and species diversity supply a range of plant and animal products on which people rely for subsistence, barter and trade. The poor communities depend more directly on biodiversity, and are more likely to have a commitment to long-term investment in managing biodiverse resource (IUCN, 2001). How'ever, some of the needs of poor communities may not be compatible with biological diversity conservation. In many cases this has led to the modification of protected area management in favour of sustainable use parks and buffer zone development, which allow local communities access to resources.

Experience however shows that local communities support conservation and sustainable use of wild lands only where markets favour the use of wild lands for economic development. For example, revenues from ecotourism can be distributed to local people, so providing them with a stake in nature conservation. Bioprospecting agreements can be another example. In order for economic incentives to be effective, it is vital that those people, who live with biodiversity, and whose behaviour influences the conservation or destruction of biodiversity, receive part of the compensation or benefit.

### **Recommendations**

It is generally accepted that programmes and projects work better, and are more sustainable, if all stakeholders participate in their design and implementation. In order to ensure a biological diversity for the security of the poor therefore, the following recommendations are made:

- Promotion of fair and equitable sharing of costs and benefits from biodiversity conservation and sustainable use at, and between local, national, regional and international levels;
- Encouragement of full stakeholder participation, including partnerships between local communities, civil society, government and private sector;
- Development of incentive measures to support conservation and sustainable use of biodiversity;
- Development of legislation and programmes of access and benefit sharing from the use of genetic resources; and,
- Provision of accurate, appropriate, multidisciplinary information, which is both accessible to, and understood by, all stakeholders.

### **Conclusion**

The underlying causes of biodiversity loss are very similar to the underlying causes of poverty: centralized planning; constraints on access and ownership; unregulated markets; weak political voice (especially of the poor).

The challenge for sustainable biodiversity therefore is to ensure that biodiversity continues to provide goods and services needed for human development. This means: maintaining a broad

base of

genetic resources; managing natural habitats so that they continue to support livelihoods, especially in areas of low agricultural productivity; addressing activities that impact on biodiversity, such as infrastructure, to prevent, minimise or mitigate negative impacts on biodiversity and poor communities; maintaining the integrity of the environment to ensure the continued protection of ecosystem services. All these, effectively implemented, will as a matter of fact, provide a sure food and other material security for mankind, most especially the poor.

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