



BIODIVERSITY INFORMATION RESOURCE SHARING AS a VIABLE STRATEGY FOR BIODIVERSITY CONSERVATION

Nyinondi, P. S. and Chaila, A. M.

Sokoine University Agriculture P. O. Box 3022, Morogoro, Tanzania.

Email: pnynondi@suanet.ac.tz; chaila@suanet.ac.tz

ABSTRACT

Availability of accurate biodiversity information is a paramount necessity in facilitating the process of decision making on biodiversity resource use and protection. In Tanzania, like other countries in East Africa, a lot of biodiversity data and information is produced, analysed and disseminated as reports, seminars, proceedings or publications. However, few people get access to them. This paper highlights the importance of biodiversity information and awareness of such information among people for maximum usage. It points out potential factors for increasing wider circulation of biodiversity information and biodiversity information resource sharing as a viable strategy in conservation. The paper also sights some of the past and present experiences in biodiversity information resource sharing in order to have a better understanding of the broadness of the strategy. It advocates the use of ICT developments in facilitating biodiversity information resource sharing and recommends ways forward, pointing out the need for an in depth study of the current situation in biodiversity information, storage, accessibility and establishment of a Biodiversity Information Facility (BIF) unit as recommended by United Nations Convention on Biological Diversity (CBD).

Keywords: Biological diversity-information-resources – conservation - ICTs- biodiversity facility unit

INTRODUCTION

Biodiversity or biological diversity describes the variety and variability of life on Earth. It encompasses all forms of terrestrial and aquatic plants, animals and micro-organisms, their genetic material and the ecosystem of which they are part (Lovejoy 1980, Reid and Miller 1989, McNeely *et al.* 1990, Chauvet and Oliver 1993).

Biodiversity is vital to human beings for their sustenance, health, well-being and recreation. However, the sustainability of the biodiversity resources, use and protection depends much on biodiversity information. According to Momodu (2002), people need information for their socio-economic development and their environment. Researchers in all economic sectors such as Weiss *et al.* (2000) appreciated the contribution of information in making rational economic decisions. In their studies, Rutatora and Mattee (2001) and Kasolupa (2005) also acknowledge the role played by information in decision making. Informed decisions are always rational ones and usually help in minimizing the extent of biodiversity extinction risks.

Information and Communication Technologies (ICTs) have changed the techniques of communicating biodiversity information. Information and Communication Technologies (ICTs) have changed the techniques of communicating biodiversity information. ICT developments have changed biodiversity



information storage, processing, and dissemination, from paper to virtual and from atoms to bits, which are now setting new standards of speed, efficiency and accuracy. Automated and digital databases are extensively used to store all sorts of biodiversity information and can be shared among authorised users.

However, ICTs are on an unequal distribution between countries and intra-country. Most of the world's computer and internet users are in developed countries. Worse still, most of those who are found in developing countries are in urban areas (Harris 2001; Chailla *et al.* 2007). Unequal distribution of information processing technologies has negative effects on biodiversity information access and use. Consequently, this affects biodiversity resource use and management, given that most biodiversity rich areas are in rural environment.

Various initiatives have been made to minimize the information gap around the world. For instance, Biodiversity Information Facility units (BIF) and telecentres are among such highly recommended institutions. Gómez and Hunt in Harris (1999) commented that telecentres have been hailed as the solution to information dissemination problems in less developed countries due to their potentialities in providing access to information and communication technologies.

According to Etta and Wamahu (2003), BIF and telecentres originated in Europe and North America in mid-1980s as a means of providing telecommunications access to rural communities. The BIFs and telecentres became key components of development strategies in many countries in Latin America, Asia and Europe by the end of 1990s. Remarkably, BIF units are using ICT in the process of making biodiversity information accessible.

In Africa, the biodiversity information centres and telecentres were introduced in 1990s to improve access to biodiversity information and ICT services. Hudson (2000) describes those information centres as tools to create, access, and share information. The expected major benefit of BIF and telecentres in Africa is the promotion of ICT use for sustainable development (Ojo, 2005).

Tanzania lags behind in terms of biodiversity information management and ICT development (Mwakalinga and Krist 2006). Tanzania like other less developed countries introduced telecentres in rural areas to facilitate access to information and communication in late 1990s. In 2001, Sengerema Multi-Purpose Community Telecentre became the first official telecentre in Tanzania. The efforts continued as other telecentres were introduced in Kilosa, Ngara, Mtwara, Kasulu, Dakawa and Lugoba. Telecentres included biodiversity information (COSTECH 2005).

However, Tanzania has not established mechanisms through which research institutions, government offices, NGOs and individuals holding biodiversity information can disseminate bio-information to rural communities through the telecentres. This situation has been largely attributed to the fact that a large volume of biodiversity information, which exists is in the form of unpublished reports, files and studies of limited distribution. In most cases, even the information holders are not known.

Review of biodiversity information and conservation

Importance of biodiversity

Biodiversity resources provide the basis for life on earth. The following are uses and values of biodiversity:



1. Provision of food. Food comes from wild species brought into domestication and those still in nature.
2. Provision of water. Water is supplied by one of nature's most important process, technically known as the hydrological cycle. Forested watersheds provide clear, high-quality water for domestic and industrial use. Rivers provide transport and fish.
3. Provisions of medicine. For most medicine are made from biodiversity resources such as plants and microorganisms.
4. Provision of industrial raw materials like wood, fibres, oil and waxes.
5. Recreational uses like tourist hunting, sport fishing and game viewing.
6. Non-use value like ecosystem services such as carbon sequestration, watershed and nutrient cycling.

Distribution and threat to biodiversity

The global geographical distribution of biodiversity is relevant to conservation. Biological diversity is said to be greatest near the equator, and declines towards higher latitudes. Tropical rain forests are known for their exceptional diversity. Some locations are known as hotspots, because of an unusually rich local diversity, perhaps due to the conditions which favour evolutionary diversification. Approximately 1.8 million species are known to science, but because many species are not yet described, an estimated 10-30 million species exist at present.

Biodiversity is threatened by human activities. It is useful to group the threats into categories namely, over hunting, habitat destruction, invasion of non-native

species, domino effects, pollution, and climate change. Habitat destruction presents the single greatest threat to the world biodiversity. The magnitude of this threat can be deduced from species-area curves and rates of habitat loss. The spread of non-native species threatens many local species with extinction, and pushes the world's biota toward a more homogeneous and widely distributed sub-set of survivors. Climate change threatens to force species and ecosystems to migrate toward higher latitudes, with no guarantee of suitable habitat or access routes. These three factors are thus of special concern.

Biodiversity information

Despite the relatively few species described, the accumulated volume of biological information and data collected over the past 250 years is massive (Blackmore 2002). Approximately three billion specimens of organisms are held in the world's natural history collections (Edwards *et al.* 2000; Schnase *et al.* 2003). Improving methods for organising, storing and retrieving the collection records is extremely critical. This alleviates the problem of users having to travel physically to the place where a specimen is housed for borrowing purposes (Edwards *et al.* 2000).

Information on biological diversity is found mainly in published scientific books and articles, in the minds of the specialists and research institutes and universities. Along with the increasing importance of biodiversity issues in international policies, information has become increasingly relevant for many interested groups other than scientists (Laihonem 2003). Biodiversity information is used in complex and controversial political, economic and environmental issues, discussions and decision-making. However, limited access to timely and relevant biodiversity information can impair decision making, planning,



environmental education and in many other similar tasks.

For scientific advancement, access to biodiversity data and information must not be restricted or conditioned. Furthermore, conservation of biodiversity must also be linked to sound policy, which in turn, requires solid scientific foundations to which biodiversity information and data networks significantly contribute.

Accessibility of biodiversity information

Biological scientists normally access biodiversity information from published scientific books, journals, proceedings, research institutes, universities, archives institutions and other repositories. However, recent development in digitalisation and ICTs has brought significant changes in the way information is generated, distributed, accessed and used (Chailla *et al.* 2007). These changes facilitate biological scientists in less developed countries to access electronic resources created by their counterparts in developed countries. In their studies, Dulle *et al.* (2001) and Chailla (2001) reported limited accessibility of information generated in less developed countries due to poor dissemination channels and technologies. The situation in Tanzania is not different to that in other less developed countries where an individual can hardly access information generated by a fellow scientist in the same institute.

The survival of biodiversity is the responsibility of all people. Unfortunately, most people access information from magazines, television, radio, newspapers, brochures, and cell phones, where biodiversity information is inadequately communicated (Strurges and Chimseu 1996; Johnson 2004). Therefore, biodiversity stakeholders continue to be inadequately informed on what actions biological scientists are proposing for

sustainable biodiversity resource use and management.

Limitation of biodiversity information access

There are numerous factors contributing to problems in accessing and disseminating biodiversity information. The most mentioned factors are: poor storage of biodiversity data, issues of copyright, and information search skills. Chailla *et al.* (2007) used the case of “digital library” and “grey literature” in institutions to show that underdeveloped ICT infrastructure is the single most important set back for information access and dissemination in the East African countries. Kapange (2006) and Moller (2006) mentioned low research funding and low staff morale as the major factors. However, Lwoga *et al.* (2006) supported Seneviratne and Gunawardena (2004), that information literacy among specific information consumers is low due to geographical, structural, and technological barriers. Rural people thus face digital divide due to information illiteracy.

The role of information in biodiversity conservation

In order to deal with the problem of biodiversity loss, we need a multidisciplinary approach, and the information industry is one of the important areas to be focused on. Information when used, serves specific problems hindering conservation, and its role in conservation process has been unequivocally documented by both developed and less developed countries.

In the USA and Europe for instance, having realized that information has become a critical part of conservation and economic development at all levels, they had to emphasises development of Biodiversity Information Facility units (BIF) and telecentres institutions to ensure



information dissemination in rural and urban areas (Hudson 2000).

Additionally, United Nations *Convention on Biological Diversity* (CBD) emphasizes information as essential tools for decision making and to reduce dependence on external influence among biodiversity users and managers.

It has been agreed among scholars that biodiversity conservation requires multidisciplinary approach. It requires increasing awareness over issues of biodiversity loss, alternative solutions to existing problems as well as information on experiences of other communities that have been exposed to solutions being contemplated. Timely information access and sharing serves wastage of resources by not doing what others have already done.

Although, Tanzania has witnessed the massive reform on policies which directly affect biodiversity conservation efforts like Wildlife Policy, Forest Policy, Fishery Policy, Environmental Policy and Land Policy in 1990s to address the problem of biodiversity loss, information sharing was not main concern in those efforts. This has been a continuing serious oversight in most biodiversity conservation strategies.

We share a similar opinion with Menou and Matovelo that such an oversight is mostly likely due to inadequacies in establishing relationships between information and conservation sector (Menou 1993; Matovelo 2000).

Incredibly, Tanzania supported the construction of information infrastructure during policies reform era. Unfortunately, the sector was treated as a separate identity. In spite of strong political motto such as 'information is power', 'information is a key tool for successes', and 'information is an essential and most critical resource for social and economic development', still there is pending

question of how many people have in reality been convinced of the relevance of information services?

Information resource sharing as a strategy for biodiversity conservation

Why share biodiversity information?

1. Generation of information has a location attribute, but its utilization may have a universal relevance. Therefore, information generated in one locus must be shared with other loci in order to have a universal and extended impact. However, documentation and dissemination of information become critical to this point to ensure multiple effects and reaching end users.
2. The resource for information acquisition is always limited, which signifies the need to ensure maximum use of the already made available information through information sharing facility.
3. Globally, discipline oriented institutions like Tanzania Forest Research Institute tend to hold more collections in their lines of specialization due to resource limitation. But when a need for information arises in categories where they are less endowed, support is sought from a documentations facility that is better endowed with the information of interest. Limitation of resources therefore restricts the diversity of a collection that one unit can afford and thus leaves it at a mercy of rescue by others (Matovelo 2000).
4. Information does not reach all relevant agents at the same time. Thus, sharing biodiversity information through selected facility units come in as best practice for intervention.



5. Therefore, sharing biodiversity information can help to create awareness on resourceful partners and thus be consulted during activities or decisions affecting biodiversity.

Global experience on biodiversity information sharing

The development of a 'Conservation Knowledge Commons' is consistent with the spirit of the Universal Declaration on Human Rights as well as the international Convention on Biological Diversity – now ratified by virtually all countries in the world except USA. The commons model while making data, information and knowledge available for conservation, research and educational uses, fully protects the knowledge of indigenous peoples and the biodiversity patrimony of developing nations from commercial expropriation. IUCN has since 1987 made its formal publications available through a commons-style permission statement printed on the page following the title page. This permission states: "Reproduction of this publication for educational or other non-commercial purposes is authorized without permission from the copyright holder, provided the source is cited and the copyright holder receives a copy of the reproduced material. Reproduction for resale or other commercial purposes is prohibited without prior written permission of the copyright holder." The IUCN endeavour to ensure information sharing resulted into formation of the global World Database on Protected Areas (WDPA) Consortium in 2002. The Consortium has evolved with a common mission to produce the World Database on Protected Areas. Such efforts complement similar efforts of conservationists in the universe like UNEP World Conservation Monitoring Centre and other information centres among CBD parties.

Increasing concern on biodiversity loss and information access has further demanded

for world's attention to inventory and monitor the wealth of biodiversity. Both Agenda 21 and CBD in 1992, insist on collaboration in the production and dissemination of information needed for the conservation and sustainable use of biodiversity. Globally, the Global Biodiversity Information Facility unit (GBIF) has been established (GBIF 2000). Several countries have already established their national biodiversity information infrastructures to meet the international requirements and their own conservation and development objectives. On the other hand, Tanzania has established a national Biodiversity Information Facility unit (TanBIF). Therefore, biodiversity information holders, and producers need to be flexible and willing to share what they have, for the purpose of ensuring biodiversity conservation.

What can be shared today and how?

For the reasons stated and with the advent of ICTs, the essence of sharing biodiversity information is much stronger today than any time in human history. If we adopt a dynamic approach that takes into consideration technological development sharing may not only be a relevant and timely initiative but also a way of ensuring the survival of life on planet earth. The following can be shared today in Tanzania and East Africa at large.

1. Information in our own creativity so that others may know where are most resourceful and thereby benefit. However, the opposite is also true which opens the venue for improvements.
2. Research results from our institutions that may have bearing at increasing innovation technologies for immediate diffuse to communities and thereby complement extension.



3. Subject matter digests and experiences in professional manner.
4. Cataloguing information from research and information centres can be shared. That way the workload can be reduced among partners and avoid wastage of time repeating a work that has already been done by a colleague at another locality.
5. Information on patented innovation and help expedite the biodiversity conservation process.
6. Researches through active joint research which will have a more evident output of cooperation ventures.

GIBF has already developed mechanism and protocols on how individuals and/or institutions can share biodiversity information. Actors on biodiversity conservation need only to adopt the protocol and start sharing available information.

CONCLUSION AND RECOMMENDATION

Several bioinformatics scholar around the world are commending the role of GBIF on biodiversity conservation. Today, one can access the digitalised and stored information from GBIF by using ICT anywhere in the world. In developing countries internet is the major means of assessing information from GBIF. However, people in rural areas can still access same information in telecentres or through their mobile cell phone.

Establishment of a National Biodiversity Facility Unit increases the chance to access information on a specific taxon or on taxa from any defined location in the country. This will enhance making rational decisions towards biodiversity resource use and management.

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