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Socio-Economic Context of Saving Biodiversity

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Abstract

Since the beginning of time mankind has depended upon the available natural resources for survival, although the contribution of biodiversity to the sustainable development has recently been acknowledged. The need for this recognition arose from the fact that biodiversity provides a variety of socio- cultural and economic services for the humankind such as food, water, shelter, medicines, energy and aesthetic value. Despite realization of biodiversity as essential factor for human life and welfare, we are facing problems of global nature. Pakistan is fortunate to have a rich biodiversity and is blessed with more than nine distinct ecological zones. These ecological zones provide a range of habitats to a great variety of flora and fauna, besides a vast variety of plant species having great medicinal and food value. However, deforestation, over development, lack of awareness and control measures have negative effects on biodiversity. These actions are leading to loss of species, habitats and degradation of ecosystems. Presently, the rate of regeneration of resources is much slower than the rate at which these natural assets are being consumed inducing a socio-economical recession. There is a need to adopt a sustainable approach towards biodiversity conservation and establish a balance between gains and loss to bridge this gap between resource generation and consumption. Preservation of biodiversity without sustainability could impact the overall economic conditions leading to further poverty and affect the quality of life of the people. This paper thoroughly reviews significance of biodiversity, its socio-economic benefits and problems currently being faced to save this natural wealth.

Keywords: Biodiversity, ecological zones, socio-economical gains, sustainability, balance.

Introduction

Diverse ecosystems are more productive than non-diverse ones. Since human economic productivity is largely reliant on earth's ecosystems, adequate bioproductivity needs to be maintained. Biological diversity commonly known as 'Biodiversity' implies the variety of life found on earth (Kevin, 2004). The United Nations Convention on Biological Diversity (CBD) defines biodiversity as 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; this includes diversity within species, between species and of ecosystems (UNO, 1993). The term variability in the definition can be considered at four levels; genetic such as genes, nucleotides, chromosomes, individuals; species include kingdom, phyla, families, subspecies, species, populations; ecosystem comprises bioregions, landscapes, habitats; and, functional level contains ecosystem robustness, resilience, goods

and services (Bennett, 2003). In spite of such a great natural wealth, the biodiversity is facing numerous problems major being lacking a sustainable approach towards biodiversity due to which socio-economic gains could not be achieved as much as expected. Therefore, there is a need to have an investigation into these problems with a view to adopt a sustainable approach to resolve the issues. This paper is aimed at highlighting the significance of biodiversity, its socio-economic propositions on the basis of economic modeling, problems being faced and a way forward for implementation to save this natural wealth. The scope of analysis and investigation is limited to Pakistan only. The facts and figures quoted may not be applicable exactly to other regions.

Overall Picture of Pakistan’s Biodiversity

Pakistan is bestowed with a gifted biodiversity setting. It has an altitudinal gradient of more than 3000 kilometers (kms) from coast in the South to snow peaked mountains in the North. With its broad latitudinal spread and immense altitudinal range, Pakistan embodies number of world’s ecological regions. According to various classification systems, Pakistan includes examples of three of the world’s eight biographic realms: the Indo- Malayan, Palaeartic and Africotropical; and four of the world’s ten biomes: desert, temperate grassland, tropical seasonal forest and mountains, which in turn support a wide array of ecosystems (Udvardy, 1975). This biological richness and the existence of ecosystems make Pakistan a unique land. Accordingly, various initiatives have been launched by Pakistan successfully to protect and preserve its precious nature in order to provide safe havens to its natural treasures. In this regard 227 protected areas of different categories (game reserves, wildlife sanctuaries, national parks) have been established all over the country (Ahmed, 1996). Pakistan is also a signatory of the UN Convention on Biological Diversity (CBD) 1993 and, as a result of the commitment; it has ensured effective implementation of CBD at all levels throughout the country. Leading international conservation organizations like the World Wide Fund for Nature (WWF) and World Conservation Union (IUCN) are also contributing for natural resource conservation in Pakistan. Affluence of Pakistan’s biodiversity is shown in Table 1.

Table 1: Overall picture of Pakistan’s biodiversity (Runnalls, 1995).

Type	Total Reported	Endemic
Mammals	174	6
Birds	668	-
Amphibians	22	9
Reptiles	177	13
Fresh Water Fish	198	29
Marine Fish	788	-
Insects	>5000	-
Plants (Angiosperms)	>5700	380
Plants (Gymnosperms)	21	-

Socio - Economic Importance of Biodiversity

From socio-economic point of view, 'biodiversity' is of interest for two fundamental reasons. First, biodiversity is valuable to society. That is, the greater the biodiversity we have, the better the standard of life. Second, choices made by society have effects on biodiversity. The socio-economic approach to the role of biodiversity is anthropocentric, in that it is fundamentally centered on people and society; and it is utilitarian, because it is focused on improving the wellbeing of people (Bennett, 2003). In other words, the approach is a deep analysis of factors that makes people better off. However, an economic analysis of biodiversity requires an understanding of the connections between the choices people make, the resultant changes in biodiversity and the subsequent changes in the wellbeing of people. Figure 1 provides a diagrammatic representation of relationship between human and biodiversity. The important aspect which Figure 1 indicates is the causal relationship between choices that people make, ecosystem and the wellbeing and standard of life the of masses. The relationship between human choices and human welfare depends on the status of the ecosystem. Therefore, it can be deduced that any economic analysis of changes in the wellbeing of people is a strong scientific process of biophysical impacts of human choices (Bennett, 2003). Since, the subject is closely related to human and its social values and choices, benefits from biodiversity are by design social cum economical in nature. Figure 1 also indicates that human environment and social actions have a strong influence on sustainability of biodiversity and ecosystem. It is useful to apply total economic value model to ascertain effects of biodiversity on human wellbeing (Bennett, 2003) which includes following:-

- The benefits achieved from goods such as pharmaceuticals and agricultural products that are influenced by the prevalence of diversity and extent of bio resources.
- The benefits generated by tourism and recreation activities that are dependent on biodiversity induced environment. This has a significant economic value.
- Life support services such as flood control, climate stabilization, environment conservation and availability of wood for different purposes etc.
- Human ethical considerations and aesthetics.

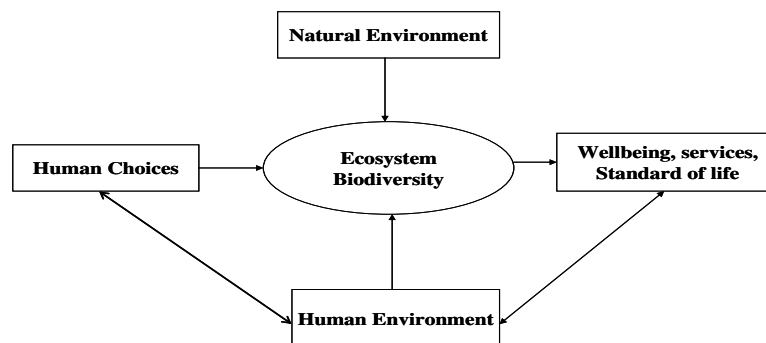


Figure 1: Human and biodiversity relationship.

Numerous researchers around the globe have looked at biodiversity with different angles, and reached to somewhat universal conclusion that biodiversity is vital for the future of life. According to latest estimates, over 60% of world population depends on the plant medicines for their primary health care and over 70% of the promising anti-cancer drugs come from plants (Kevin, 2004). Many species of insects support agriculture and forestation through pollination and biological process, while some serve as indicators of human social environment, for example, lichens are well known indicators of air quality. A high biodiversity helps to keep the environment clean, both in soil and water. More so, it provides an aesthetic value which attracts tourists and visitors and thus contributing to the economy and social interactions.

From Pakistan's point of view, socio-economic gains of biodiversity (in terms of percentage composition) are shown in Figure 2. Research indicates that populace of northern areas of Pakistan use flora and fauna for food and other basic necessities which make biodiversity an imperative life-support base for more than 2 million inhabitants of the region (Dani, 2001). Therefore, the diverse agro-ecological zones of Pakistan have provided economic opportunities to the people who are engaged in agriculture, animal husbandry, forestry, trade and tourism.

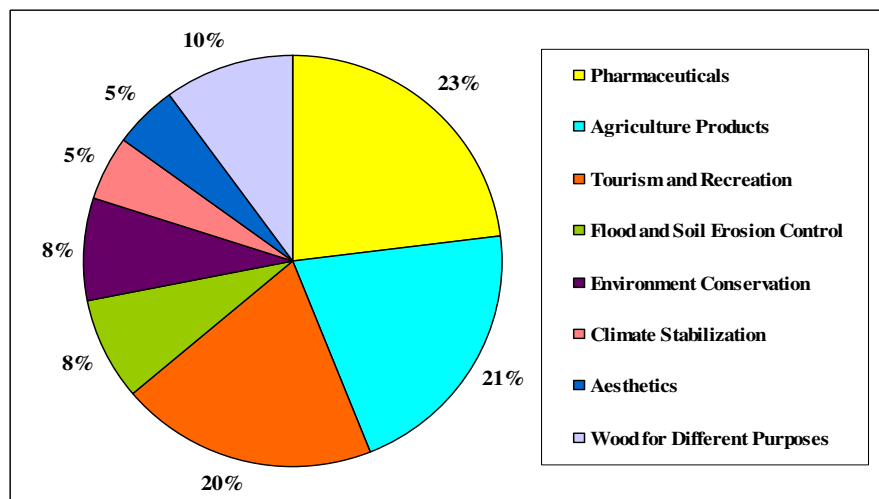


Figure 2: Economical benefits of biodiversity with percentage share of each component.

Economic Modeling

Basing on the above discussion economic modeling of the biodiversity gains was done which is reflected in Figure 3. As a first step, the statistical data for this modeling was gathered from population in different regions of Pakistan with a cluster size of 200 people. Generally, about 79% of the investigated populace attributed biodiversity as an important element for socio-economic development whereas 21% share of the populace considered it essential but not a priority at this moment; their stance is just a reflection on lack of awareness regarding biodiversity and ecosystems. Thereafter, a market and non-market survey was carried out to find the economic inputs for economic modeling between biodiversity and economic development indicators using a benefit cost analysis (BCA) approach. The graph obtained

from this research (Figure 3) looks sample, but in fact it is not; each kink on the graph has significance reflecting the impact of particular contributing factor on the relationship.

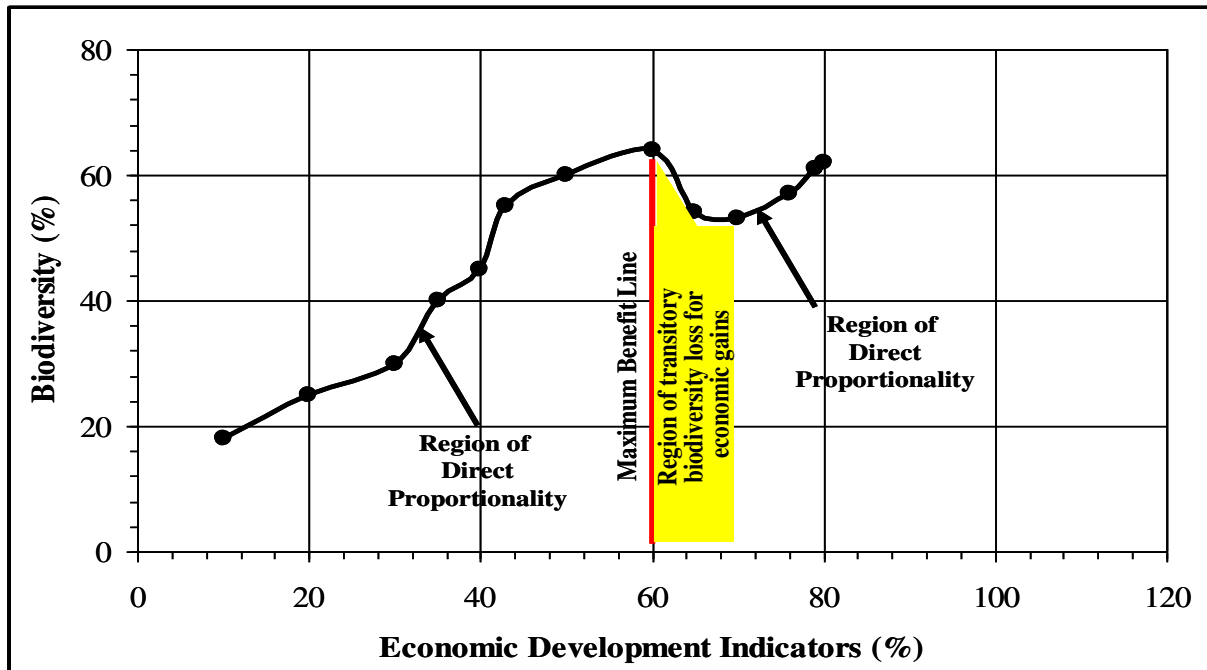


Figure 3: Economic modeling showing relationship between economic development indicators and biodiversity.

Following aspects can be concluded from this graph.

- As can be seen, the relationship exhibits direct proportionality upto the line of maximum benefits; the more the biodiversity, the more the economic development of the society.
- Maximum up to 60% increment in economic development indicators can be achieved with 62% increment or preservation of biodiversity. This manifests the direct proportionality of the relationship.
- However, ahead of 60% increment in economic development indicators, the relationship attains an inverse status whereby economic development indicators shows improvement with transitory reduction in biodiversity. This means that at certain stage we have to compromise on biodiversity to achieve economic development. Therefore, it is equally safe to conclude that society does not want total biodiversity protection as that would mean the abandonment of activities such as commercial agriculture, tourism and economic utilization of plants and wood. After all there has to be economic progression utilizing bio-resources. In other words, what society needs is a mechanism for determining the appropriate balance between biodiversity protection and human activities that result in biodiversity loss. So, the new real challenge emanating from the economic analysis of biodiversity is establishing a balance between economic progression and biodiversity preservation. This marks the fundamental difference between the approach of biologist, agronomist and economist. The issue is summarized below.

- Since most species need an undisturbed environment to find food, water, shelter and mates, habitat loss is considered one of the leading causes of biodiversity degradation. Many activities are responsible for habitat loss such as, grazing animals, wood and plant utilization, agriculture and excessive land development, but, on the other hand these activities are essential for economic progression.
- Biodiversity is a source of energy (such as biomass). Other industrial products as oils, lubricants, perfumes, fragrances, dyes, paper, waxes, rubber, latexes, resins, and cork, are derived from various plant species. Supplies from animal origin include wool, silk, fur, leather, lubricants, and waxes. We need all these items for economic gains.
- All natural areas are exposed to human use in one way or another. This creates disturbance in the natural environment leading to deterioration of biodiversity but tourism and recreational trade is a great contributor to economic development.
- After the transitory loss in biodiversity, economic development indicators again show enhancement with improvement and preservation of bio-resources.

Thus, from an economist point of view, we need to preserve the biodiversity to have bio-resources which are utilized in processes essential for economic development; this utilization will cause temporary (transitory) loss of biodiversity; preservation and improvement of this balance biodiversity will again provide us with bio-resources for further utilization. This is reflected by a Gul's Chain in Figure 4. Thus, if bio-resources have been used for economic progression, economist may not call it a biodiversity loss, though biologists and agronomist may. This calls for sustainability in preservation of biodiversity for economic gains.

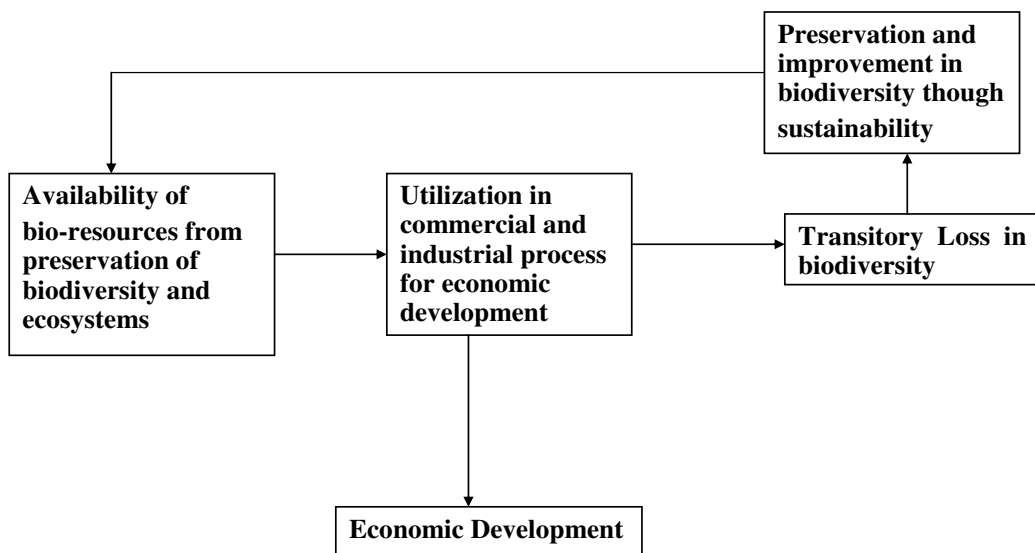


Figure 4: Gul's Chain for sustainable biodiversity.

To validate the above facts, a useful cost benefit analysis (CBA) was carried out for the factors which gives economic gains but causes transitory loss in biodiversity. A careful look

on the analysis shown in Figure 5 reveals that it is not simply preservation, but it is the sustainable preservation of biodiversity which is essential to achieve two fold benefit of conservation of biodiversity and ecosystems and at the same time economic development.

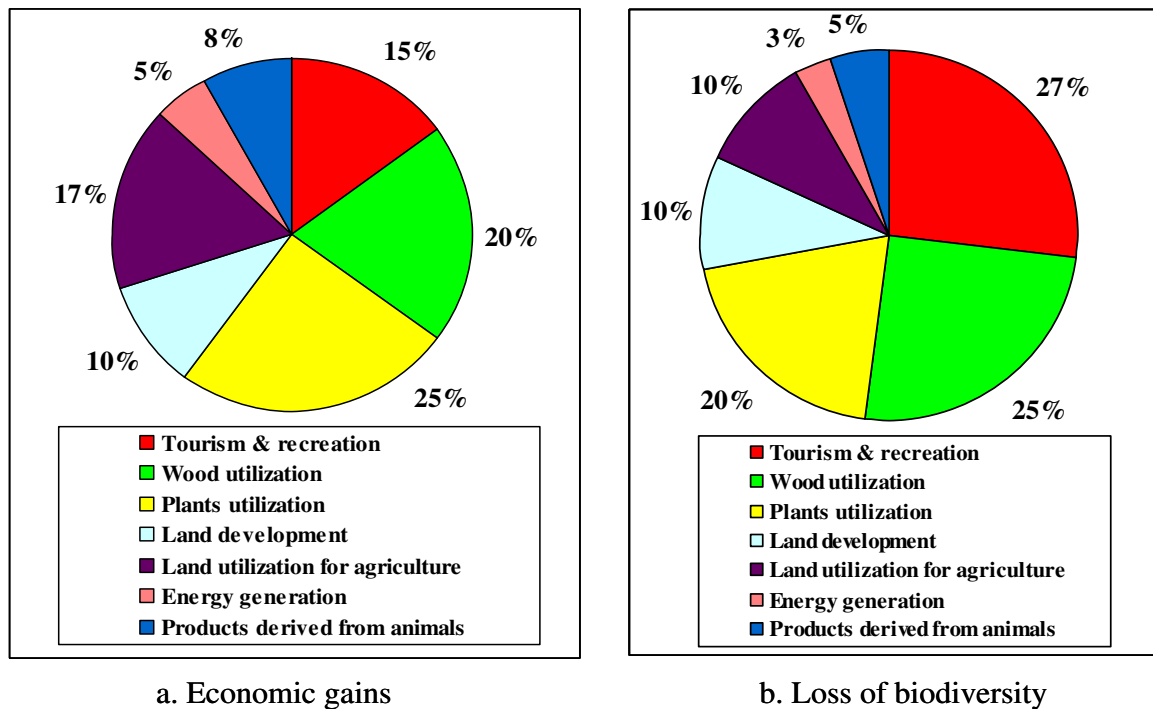


Figure 5: Effects of contributing factors on economic development and biodiversity loss.

Few interesting conclusions can be drawn from Figure 6.

- For most of the factors, economic gain is more than transitory loss to biodiversity, except for tourism and recreational activities and wood utilization; for which the loss in biodiversity is more than economic gain.
- Bulk of the economic gain is received from tourism and recreation, wood and plant utilization (accumulative economic gain for the three is 60%) but, at the same time bulk of the biodiversity loss is made by the same three factors (accumulative loss for the three is 72%). The accumulative loss of biodiversity (72%) for the three major factors is more than accumulative economic gain (60%).
- Maximum economic gain (25%) is made from plant utilization, for which the biodiversity loss (20%) is not maximum. Similarly, the maximum loss (27%) to biodiversity is due to tourism and recreation, for which the economic gain (15%) is not maximum.
- There is a casual relationship between economic gains and biodiversity.

The above analysis points towards establishing a balance between use and generation of bio-resources; this can be achieved by adopting a sustainable approach towards biodiversity. In

fact, the whole issue revolves around the sustainable preservation of biodiversity to convert transitory loss of biodiversity into economic gain.

Social Causes of Biodiversity Loss

Not only the economic and commercial activities, but there are certain social customs which have harmful effects on biodiversity. These social reasons have a linkage with choices of the people and have great relevance to protection of ecosystems and biodiversity. Few social causes of loss to biodiversity are listed below:-

- Tradition of hunting is on increase. Hunting has also been facilitated by advanced weaponry and easier mobility by construction of roads into areas which were difficult to access in the past. Besides professional hunters, it has been observed that one out of five tourist group is practically visiting mountains with secondary objective of hunting (Mufti, 1997).
- An agricultural activity on the slopes and poor management of irrigation canals has resulted into biodiversity loss. Additionally, these activities cause soil erosion which again is detrimental for bio-environment (Ramakrishnan, 2000).
- Native breeds are replaced by exotic ones and are often crossbred leading to erosion of genetic diversity (Rasool, 1998).
- Due to improved road links, trafficking of plant and animal species has increased.
- The population rate is growing faster which leads to an increased demand for food, shelter and energy. This puts great stress on the natural resources including bio-resources.
- There is general lack of awareness about biodiversity. Common masses have very less knowledge about the pluses and minuses of biodiversity.

Conclusion

Pakistan represents a rich biodiversity. However, constant loss of biodiversity would affect the standard of life of the people and the overall economy of the country. Therefore, conserving biodiversity and ecosystems is crucial in order to contribute to social and economic development and improved quality of life. Effective steps cannot be taken until and unless the seriousness of the subject is realized. Masses should be educated on the significance of sustainable biodiversity conservation. Undoubtedly, environmental education fosters a caring attitude towards nature. Participation of local people should be ensured. Community based biodiversity conservation increases pilot activities and provides an institutional framework necessary for such projects to flourish. Sustainable approach for preservation of biodiversity should be adopted to convert transitory loss of biodiversity into economic gains. Realistic and pragmatic control measures for conservation of biodiversity should be enforced.

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