

Environmental Role of National Parks

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Abstract

The natural ecosystems are endangered due to human behavior; the razing of forests is diminishing the world's oxygen supply and potentially irreplaceable natural resources. Wetlands are being drained, eliminating breeding environments for millions of birds and reproducing grounds for fish; cherished fauna and flora species are being endangered from extinction. Clean water, clean air, access to food sources, buffers of weather events, cultural and spiritual values, and raw materials for consumers, are some of the ecosystem services that ensure the well-being of humanity. Well-managed protected areas are a proven mechanism in the protection and conservation of healthy ecosystems and the services they provide. National Parks are essentially planned to shelter the lasting "wilderness" of a given country and have principally dedicated on the maintenance of extraordinary areas or emblematic species. This paper is aimed at exploring the environmental role of national parks by having an extensive literature review and come up with recommendations which can help the conservation of national parks.

Keywords: parks, environment, forests

1. Introduction and Background

The degradation of environmental can impede developmental efforts in two ways. Firstly, it diminishes the wellbeing of a community by draining the natural resources and decreasing the value of the environment in various ways. Secondly, it decreases longer term productivity and thereby the forthcoming earnings of a given society. This seems a vicious circle in that; as humans use natural resources beyond the replenishment capacity of the system and deplete its productivity; for compensation of the shortage of production; further degradation of natural resources will continue. This overuse of natural resources aggravates the degradation of the environment and declining of productivity which continues to keep poverty increasing (World Development Report, 1992).

Publicly or communally owned natural resources such as parks, natural forests, wetlands are important natural resources as they have useful effects on ecological balances and also for they are the meanses for the livelihood of many local people worldwide; especially in the developing countries. However, due to increased population growth, lower productivity of agriculture and fast expansion of farmlands in most developing countries many environmentally important areas such as parks are highly degraded. The main reason behind such environmental resource mismanagement, among other things is poverty. Poverty may force people to use available resources to the limit and beyond the limit of the capacity of natural resources because people frequently encroaches environmentally conserved areas in search of their livelihood (Anemut, 2006; Inglis, 2008).

Effectively managed and maintained ecosystems also play a pivotal role for human health that goes beyond the deleterious effects of environmental pollutants. For instance, natural disasters have adverse impacts on the physical as well as mental health of mankind; biodiversity can also have a negative effect on health as a result of exposure to diseases or toxin substances; and biodiversity and integrated ecosystem services can have a positive effect on health related issues through changes in the aesthetic, cultural and recreational attributes of the natural ecosystems. In the language of ecosystem services, negative health effects are a result of ecosystems failure to control natural disasters and diseases to a certain extent; while positive effects of health are resulted since ecosystems provide a range of cultural services that are imperative for the well-being and henceforth health (Alderman, K. *et al.*, 2012; Keesing, F. *et al.*, 2010; Lee & Maheswaran, 2011).

The contribution of protected areas to the economy of many countries is also significant by contributing a lot for the livelihoods and well-being of the nation through income and employment generation. Therefore, so as to

attain biodiversity conservation and its contribution for poverty reduction, protected areas management should be considered as an integral part and parcel of the wider sustainable agenda of development for a nation (Lea *et al.*, 2004; Lisa *et al.*, 2008).

Clean water, clean air, access to food sources, buffers of weather events, cultural and spiritual values, and raw materials for consumers, are some of the ecosystem services that ensure the well-being of humankind. Well-managed protected areas are a proven mechanism in the protection, conservation and maintenance of healthy ecosystems and the services they provide (Lisa *et al.*, 2008). According to David (2012) National Parks are also planned to shelter the lasting "wilderness" of a given country and have principally dedicated on the maintenance of extraordinary areas or emblematic plant and animal species. National parks have many roles among which "preserving nature" has become a matter of considerable social, political, economic and scientific concern, an integrative whole system approach.

The natural ecosystems are endangered due to human behavior; the razing forests is reducing the world's oxygen supply and potentially irreplaceable natural capitals. Acid rain is spoiling the air and many of those trees left. Wetlands are being drained, eliminating breeding grounds for millions of birds and spawning grounds for fish; valuable plant and animal species are being threatened with extinction. Simple human greed is destroying virtually overnight a natural wealth which has taken millennia to amass (IUCN/UNEP/WWF, 1991).

2. Objectives

Explore the environmental importance of parks; and forward recommendations to facilitate the development and sustainable utilization of park ecology.

3. Methods

The formulation of the article required from finding and evaluating appropriate materials to synthesizing the information from numerous sources by critical thinking and evaluation. A set of summaries were drawn in the form of critical analysis and discussion. A range of awareness and divergent arguments, theories and approaches were critically reviewed and analyzed by being directed as per the research objective.

The article endeavored to rationalize the role of national parks to the environment by interpreting a number of facts as per the objectives. The article also compared and contrasted the diverse understandings and issues of the environmental role of parks on the environment with a major emphasis on the woody vegetation.

4. Result and Discussion

4.1 Types of Natural Resources

There are two types of natural resources. These are natural resources which are deple or non-renewable and those which are renewable. Deple natural resources are those natural resources where their potential reserves can be exhausted, and on the contrary renewable resources are distinguished from deple resources mainly as they can be replenished at a non-negligible rate. However, for some renewable resources their sustained availability mainly depends on human intervention.

The efficient utilization of renewables possesses a different challenge from the management of deple resources, even though both resources are similarly important.

The issue with the deple resources is the efficient utilization of the stock without compromising the benefits of the future generation (Titenberg, 2003). On the other hand, the challenge for managing renewable resources involves the maintenance of an efficient sustainable flow.

4.2 The Idea of Parks

The word 'Park' comes from the Medieval Latin *parricus*, which means 'enclosure'. 'Reserve' also originates from the Latin *reservare*, meaning 'save'. Indeed, 'preservation', 'protection', and 'conservation' essentially imply that certain areas or natural aspects are kept away from the present demand. Similarly, 'establishment' denotes a legal event of bringing into existence and 'management' implies certain techniques of supervising the area, frequently involving a whole range of new institutions, professionals and methods. It is clear that the areas included in parks and reserves retain such resources like grazing land for wild animals, forest, water, wildlife, and grasses. Parks may also represent many cultural, aesthetic and spiritual values locally. Important decisions in relation to the sustained utilization and protection of certain natural resources have been made throughout human history, at times provoking long lasting conflicts (Ghimire and Pimbert; 1997). A common reasoning has been that parks and reserves are for the 'common good', established and managed through 'impartial' state institutions. The prime objective establishing parks is for the protection and sustenance of biological diversity. However, in the actual and present setting this may not be seen being practiced in many parks (Western and Giochoi, 1993).

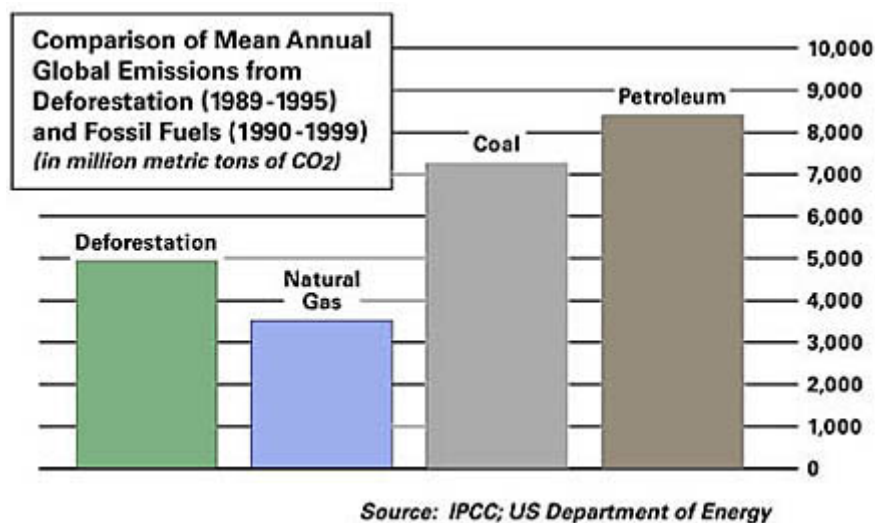
4.3 Role of Parks' on Environment

The prime objective of national parks is conservation. The forests-vegetation-parks provide many important benefits to the environment: providing shelter for all species living on land, through carbon sequestration forests also serve to combat global warming and climate change. Forests also contribute a lot in moderating local and regional rainfall distribution and intensity. In addition to this, forests have medicinal, aesthetic and recreational values apart from serving as source of food, clean water, etc. benefits for millions of people.

4.3.1 Role in Climate Change

Forest plants and soils are the storehouse of carbon, and hence play a pivotal role in balancing weather and climate at local and regional levels by carbon sequestration through photosynthesis and discharging it over respiration.

However, it is a sad fact that, in many parts of the world forests are being cleared for different livelihood activities like timber, fuel wood, farming, fiber, etc. and when forests are burned or cleared from the surface, they will release carbon back to the atmosphere as their role to store carbon is being altered by human activities. Tropical deforestation is responsible for approximately 20% of total human-caused carbon dioxide emissions each year, and is a primary driver of extinction of forest species (see graph below) (Schimel, D.S. *et al.*, 2001).



According to Shivastava (2002) forests influence humidity, solar radiation, temperature and wind. Forested areas are cooler during summer and warmer in winter than are open areas, due to dense canopy. This holds true in the daily fluctuations. Thus, forests has a moderating influence on temperature. In the night forest canopy prevents reradiation of heat gained during the day. With in a forest the air is more moist than on the outside as the forests provide obstruction to wind. Rain bearing winds are deflected further up in to the atmosphere if a mountain range is forest covered; thus causing the air to become cooler and providing more precipitation.

4.3.2 Control of Runoff/Water Loss

The tree leaves and branches intercept the rain, causing the moisture to drip rather than reach the earth with a force. The ground litter and humus absorbs the water and reduce runoff. Organic matter keeps the soil porous and permeable, allowing seepage and storage of water in to the substratum (Bryan *et al.*, 2005).

4.3.3 Reduction of Wind Erosion

Wind in the treeless areas increase evaporation, dry the soil, remove fertile top soil, and blow sand over fertile lands. Trees act as windbreaks and shelterbelts. Wind speed is highly reduced (Bryan *et al.*, 2005).

4.3.4 Environment for Fish

Forest vegetation prevents excessive stream temperature by shading the water courses which is congenial for fish life. Removal of trees from creeks and streams in USA resulted in water that was undesirable for the existence of trout fish. Forests also help to produce clear streams most desirable for fish life.

4.3.5 Wild Habitat

Forests provide food and shelter to many kinds of wild life. When forest trees are removed, some kinds of wild

life disappear. With the restoration of tree habitat, other kinds of wild life dependent on shrubs, weeds and young trees may occupy the area. When trees and other forest vegetation are destroyed, all wild life will disappear for a long time.

4.3.6 Pollution Control

Trees intake pollutants from the air during their normal gas exchange. Small amounts of sulfur dioxide is taken and used in metabolism of the trees. Also trees take up various soil and water pollutants through the roots and aid in cleaning soil and water.

4.3.7 Noise Abatement

Noise can be abated by proper use of trees and plants. If placed between the source of noise and people, even a few trees can be effective. Deciduous trees are not much effective in winters. To be effective trees should be close to the source of the noise.

4.3.8 Serves as a Buffer Zone

The integrated ecological roles of forest trees, shrubs, forbs, grasses, water bodies, soils, etc. is a vital element of a healthy ecosystem services and functions. As ecosystem functions are highly dependent on the existence of a network of these different resources which has different roles and functions in creating a health environment, the combined effort of these resources will help in the creation of a healthy ecosystem such as to filter water resources, serving as sink for carbon, facilitating the existence of health ecosystem for different microorganisms, shelter and feed for wild animals, improved habitats for fish, etc.

5. Discussion

A complex mix and interlocking problems are reaching crisis levels nowadays on the beautiful planet earth, which is the only home for us and a rich diversity of other life forms. Each year more of the world's forest, grass lands and wetlands disappear, and deserts grow in size as more people increase their use of the earth's surface and its resources. Vital top soil is washed or blown way from farmland and cleared forests and then clogs streams, lakes, and reservoirs with sediments. Every hour, as many as six of the earth's wild species are driven to permanent extinction by human activities (Miller, 1992).

The ecological benefits of forests have been well recognised since history began and were recorded in the writings of the ancient Greeks and Romans:

"There were large forests in the mountains whose traces are still visible today. If, in these mountains, some only nourish bees, not so long ago trees were cut for large construction needs... The soil provided infinite foraging possibilities for livestock and also collected Zeus' annual rainwater, which did not run over bare soil into the sea as it does today. Since the earth was still thick and received water which it stored in impermeable clay, it let water it had absorbed in the heights run down into the valleys, providing abundant springs and large rivers everywhere. (Plato, Critias, III)." (quoted in European Parliament 1997 in Bill, 2003).

Trees are the major constituent of a forest ecosystem and therefore playing a major role in backing the very existence of many fauna and flora species. Likewise, trees also exhibit ecological and economic significance even in areas that are not categorized as forests by being source of shade, fixing nitrogen, source of edible fruits, etc. As trees normally live for ages, they will experience the changing environmental conditions which enable them to have a continued adaptation and coping mechanisms which best suits their ecological conditions (Koskela *et al.*, Undated).

A forest, produces oxygen, filters clean air and water, stores carbon, moderates climate, and protects against soil erosion. It is also a biodiversity reservoir with an abundance of plant, animal and other species that in many cases are unique to this area. To maintain these environmental benefits, the biodiversity of the various species and ecosystems must be protected (NRC, 2007). The inappropriate utilization of natural resources will result in the creation of unhealthy ecosystems, global warming and climate change (Breman, 1992).

Forest products such as timber and wood are among the renewable natural resources. The sustained production and utilization of wood do have a positive impact on the environment which we live (Bill, 2003).

Forested areas absorb much of the sunlight reaching the earth's surface for photosynthesis and only 12 – 15% of the light is reflected back to the atmosphere.

The largest quantity of energy absorbed by forests acts as a stimulate current in air which further enhances the formation of rainfall.

Contrary to this, degraded and deforested areas reflect back around 20% of the incoming sunlight. As a result of

this, deforested areas will be further dry and thereof escalating the risk of desertification and climate change. During photosynthesis, trees do absorb carbon dioxide hence contributing in the fight against the greenhouse effect and climate change. Deforestation takes away a potential sink for the carbon dioxide we are pumping into the atmosphere. In addition, if forests are removed by burning, a lot of extra carbon dioxide locked up in tree wood is returned to the atmosphere (Bill, 2003).

Presently, climate change is posing the prime environmental, social and economic challenges to mankind. During the last century, the Earth's average surface temperature rose by 0.6°C. Environmentalists assert with a proof that the global warming that has occurred during the last 50 years is mainly caused by human interference activities in to the natural environment. In its Third Assessment Report (TAR), the Intergovernmental Panel on Climate Change (IPCC) (<http://www.ipcc.ch/>) projects that global average surface temperatures will rise by a further 1.4 to 5.8°C by the end of this century (Roper, 2001, cited in BM, 2006).

This rise in temperature and global warming is resulting various and frequent disasters to humanity and different forms of life, including the sea level rise, flood, drought, disease outbreaks, etc. The main human interferences which contributed the lion's share of the change in climate among others is attributed to the burning of fossil fuels and deforestation which causes emission of carbon dioxide (CO₂), the main gas responsible for climate change, as well as other 'greenhouse' gases (BM, 2006).

Therefore, conservation of forests in protected areas and forest rehabilitation initiatives are generally renowned as a means of potential greenhouse gas (GHG) mitigation measures. Hence, protecting and maintaining the natural ecology of national parks in particular and protected areas in general broaden the capacity of the terrestrial carbon sink and sustenance of a healthy environment.

6. Conclusion and Recommendations

National Parks are the shelters for wild animals and plants that would otherwise extinct by the hands of humans. They also provide protection to numerous endangered and defenseless species, protect dwindling habitats, and avail protected breeding sanctuaries in which threatened species can recover. With everyone's care and positive attitude, these essential ecosystems can be protected for the benefit of the future generations.

Degradation of natural resources is a serious threat to sustainable development worldwide. The impact of natural resources degradation is more severe in the developing countries as a significant percentage of the population in these countries is dependent on natural resources for their livelihood. Mounting population pressure forces those households in these countries to over exploit natural resources leading to increased poverty.

Motivation of the households to toil for the protection of National Parks is negatively as well as significantly related to expected losses. This means those households who loss from apiculture, loss of income from livestock (grazing), the loss because of wildlife attack, cost of thatching grass, cost of firewood, cost of house construction poles, cost of woody agricultural implements less the gains directly or indirectly from the parks as it is conserved. Thus, success in conserving the parks depends on fair interplay of factors that would contribute to loss and benefits.

Therefore, the following specific interventions could be suggested. Strengthening and development of ecotourism undertakings; utilization of tourism revenue for the local development; implementing initiatives which could lessen the reliance of the indigenous community on the natural resources of the park resources as for instance expansion of modern or energy saving cooking and heating appliances, replacing woody agricultural farm tools with iron made implements, and developing tree nursery sites on individual or community base for forest production aimed at the production of fuel wood and construction materials, etc.

Above all on top of these, raising the level of awareness of local communities on the ecological and economical role of parks has a paramount importance for the conservation of parks.

References

- Amend, S., & Amend, T. (1995). *National Parks With Out People: The South American Experience*. IUCN, Gland.
- Anemut Belete. (2006). *Determinants of Farmers' Willingness to Pay for the Conservation of National Parks: The Case of Simen Mountains National Park*. Haromaya University, Ethiopia.
- B and M Development Consultants PLC. (2006). *Climate Change Enabling Activity*. Addis Ababa, Ethiopia.
- Baily, C. (1991). Conservation and Development in the Galapagos Islands. In P. C. West, & S. R. Brechin (Eds.), *Resident Peoples and National Parks: Social Dilemmas and strategies in International Conservation* (pp.187-199). University of Arizona Press, Tucson.

- Bidol, P., & Crowfoot, J. E. (1991). Towards an Interactive Process for Siting National Parks in Developing Nations. In P. C. West, & S. R. Brechin (Eds.), *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation* (pp. 283-300). University of Arizona Press, Tucson.
- Bowman, D. (2012). *National Parks: Vegetation, Wildlife and Threats*. University of Tasmania, Nova Science Publishers.
- Breman, H. (1992). Desertification control, the West African case. *Biotropica*, 24, 334. <http://dx.doi.org/10.2307/2388526>
- Embassy of the Federal Democratic Republic of Ethiopia (EFDRE). (2008). *Tourism, National Parks*. Retrieved April 21, 2015, from http://www.Ethiopia-emb.or.jp/tourism_e/park/index.html#04
- Federal Democratic Republic of Ethiopia Central Statistical Authority. (2004). Statistical Abstract, Addis Ababa, Ethiopia.
- Ghimire, K. (1994). Park and People: Livelihood Issue in National Parks Management in Thailand and Madagascar. *Development and Change*, 25, 195-229. <http://dx.doi.org/10.1111/j.1467-7660.1994.tb00514.x>
- Inglis, J. (2008). Using Human-Environment Theory to Investigate Human Valuing in Protected Area Management thesis submitted in fulfillment of the requirements of the Degree of Doctor of Philosophy, Victoria University.
- International Institute for Environment and Development (IIED) and World Resource Institute (WRI). (1987). *World Resources*. New York: Basic Books.
- IUCN/UNEP/WWF. (1991). *Caring for the Earth, A Strategy for Sustainable Living*. Gland, Switzerland.
- K., L. T., & Hong, V. R. (n. d.). *Conservation of forest genetic diversity in South Asia*. Serdang, Malaysia.
- Kothari, R, Pandle, P., Singh, S., & Dilnavaz, R. (1989). Management of National Parks and Sanctuaries in India, status report, Indian Institute of Public Administration, New Delhi. Jarkko.
- Lisa, J., Kieran, N., Sarat, B., & Kalemani, J. (2008). Secretariat of the Convention on Biological Diversity. Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. Montreal, Technical Series no. 36.
- Machlis, G. E., & Tichnell, D. L. (1985). *The State of the World's Parks; An International Assessment for Resource Management, Policy and Research*. Boulder, Westview Press.
- Miller, G. T. (1992). *Environmental Science*. Wadsworth Publishing Company (4th ed.). Belmont, California
- Munthali, S. M. (1993). Traditional and modern wildlife conservation in Malawi: The need for an integrated approach, *Oryx*, 27: 185-187. <http://dx.doi.org/10.1017/S0030605300028003>
- Newby, J., & Grettenberger, J. F. (1986). The Human Dimension in Natural Resource Conservation: A Sahelian Example from Niger. *Environmental Conservation*, 12(3), 249-256. <http://dx.doi.org/10.1017/S0376892900036304>
- NRC. (2007). *Natural Resources Canada Benefits of the boreal forest, part 1*. Retrieved from <http://www.nrcan.gc.ca>
- Scherl, L. M., Wilson, A., Wild, R., Blockhus, J., Franks, P., McNeely, J. A., & McShane, T. O. (2004). Can Protected Areas Contribute to Poverty Reduction? Opportunities and Limitations. IUCN, Gland, Switzerland and Cambridge, UK. viii + 60pp. <http://dx.doi.org/10.2305/IUCN.CH.2005.6.en>
- Schimel, D. S. et al. (2001). Recent patterns and mechanisms of carbon exchange by terrestrial ecosystems. *Nature*, 414, 169-172. <http://dx.doi.org/10.1038/35102500>
- Shivastava, M. B. (2002). Introduction to Forestry, the Papua New Guinea University of Technology, Lae.
- Steven, R., West, P. C., Harmon, D., & Kutay, K. (1991). Resident peoples and Protected Areas: A Framework for Inquiry. In P. C. West, & S. R. Brechin (Eds.), *Resident Peoples and National Parks: Social Dilemmas and strategies in International Conservation*. University of Arizona Press, Tucson.
- Swistock, B. R., DeWalle, D. R., & Farrand, E. P. (2005). Windbreaks and Shade Trees. The Pennsylvania State University. Produced by Ag Communications and Marketing, Code# UH172 R7C3/11mpc1929.
- Talbot, L. M. (1982). The Role of Protected Areas in the Implementation of the World Conservation Strategy. In Jeffrey A., Mc Neely, & K. R. Miller (Eds.), *National Parks, Conservation and Development: The Role of Protected Areas in Sustaining Society*. International Union for Conservation of Nature and Natural

Resources (IUCN), the Smithsonian Institution.

Tietenberg, T. (2003). *Environmental and Natural Resource Economics*. Pearson Education, New York City.

West, P. C., & Brechin, S. R. (1991). *Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation*. University of Arizona Press, Tucson.

Western, D., & Giochoi, H. (1993). Segregation effects and Impoverishment of Savana Parks: The case for Ecosystem viability analysis. *African journal of Ecology*, 31, 269-281. <http://dx.doi.org/10.1111/j.1365-2028.1993.tb00541.x>

Zewudu, B., & Yemsirach, A. (2004). Willingness-to-pay for Protecting Endangered Environment: The Case of Nechsar National Park. Social Science Research Report. 31pp.

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