Challenges to National Park Conservation and Management in Ethiopia

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Abstract

National parks are areas of land protected to conserve native plants and animals and their habitats, places of natural attractiveness, historic heritage and native cultures. The objective of this review paper was to identify challenges affecting conservation and management of national parks in Ethiopia and based on review results, to suggest management strategies that can bring solutions to the problems. Lack of sense of ownership, limited awareness, population growth, lack of coordination, conflicts over resources, Issues of boundary/Lack of Boundary, invasive species, illegal charcoal production, climate change, and poverty are the identified challenges that are affecting the conservation and management of national parks in Ethiopia. Developing sense of ownership within community, awareness creation and development, collaborative approach and consultation among stakeholders, co-management and resolution of border issues, reduction of free grazing, invasive species utilization, care during introduction and biological control, reduction of fuel-wood consumption and increase carbon sequestration, improving incomes, institutional and policy reforms are the suggested strategies that can bring solutions to the problems.

Keywords: carbon sequestration, conservation, free grazing, invasive species, management, national park, native plants, poverty

1. Introduction

Protected areas cover almost 13% of the Earth's land surface (Chape et al., 2003). In parts of the world where most of the landscape has already been transformed by anthropogenic activities, therefore these protected areas can be the only natural or near-natural ecosystems remaining (Stolton et al., 2015).

According to Dudley (2008), these areas are the cornerstones of national and international conservation strategies. Thus, protected areas are ecosystems where science-based directed efforts are made in order to protect wild species and maintain ecosystems health to ensure the long-term survival of endangered species (Stolton et al., 2015). It has long been recognized that healthy natural ecosystems provide a multitude of ecosystem services that support, for example, food security, oxygen production, water infiltration, pollination and climate regulation (MEA, 2005). Through their role in maintaining ecosystems, species and their services, protected areas offer a 'natural solution' for climate change adaptation (Dudley et al., 2004). These areas can also contribute to climate change mitigation through their role in storing and sequestering carbon in soils and standing biomass (Sharma et al., 2013).

Ethiopia, located in the horn of Africa is a relatively large country having a wide diversity of topography, parental bedrocks, and climates. This topographic diversity, across a 4620-meter altitude span, has resulted in wide variations in rainfall, humidity, temperature, and soils. The country harbors six of the world's major terrestrial biomes (alpine, coniferous forests, deciduous forest, tropical rain forest, savanna, and desert) and nine distinct ecosystem types (BIDNTF, 2010). Across all these nine different ecosystem types, there are 52 conservation areas with official protection status. These include 20 National parks, 3 wildlife sanctuaries, 2 wildlife reserves, 17 controlled hunting areas, 7 open hunting areas and 3 community conservation areas (EWCA, 2012). The difference between the different conservation statuses includes a wildlife sanctuary does not allow people to live inside it but a wildlife reserve allows people to live together and conserve wildlife (Vreugdenhil et al., 2012).

National parks are areas of land protected to conserve native plants and animals and their habitats, places of natural attractiveness, historic heritage and indigenous cultures (NSW, 2015). Also, these areas are centers of gene-banks (*e.g.* for wild coffee and *enset*) and traditional ecological knowledge and have a direct economic benefit to the country; bringing in international revenue from tourism and carbon trading (Young, 2012).

Four of the Ethiopian national parks, one of the wildlife sanctuaries and three of the community conservation areas are currently under different forms of international trade mechanisms for climate change mitigation, like CDM (Clean Development Mechanism, *e.g.* Humbo) and REDD$^+$ (*e.g.* BMNP). This means that international funding helps to finance the protection. This is important since Ethiopia is a low-income country and budgets for nature conservation are small. This is also the case when international conservation NGO's like Frankfurt Zoological Society or WWF supports national parks with funding and management advice.

1.1 Statement of the Problem

Conservation of Ethiopia's biodiversity and ecosystems is vital to ensure sustainable development, to mitigate and adapt to the effects of climate change and to prevent the collapse of life-supporting ecosystem services (Young, 2012). According to Gashaw (2015), protected areas were created to protect the major biodiversity throughout the world. Thus; these areas have a significant role in conserving biodiversity. However, it is a sad fact that these ecologically fundamental resources are usually undervalued and are under threat from population growth and the ever-increasing human need (Zerga, 2015).

In poor countries like Ethiopia, protected areas are often referred to as "Paper parks" since the pressure from the poor rural population is larger than the possibility to protect the natural resources from exploitation. Therefore the officially protected areas are often still utilized for traditional livelihood support, which they have been for a long time, and which is not per definition destructive if the further intensification of resource extraction can be avoided. Often the rural communities were already settled there before they were decreed as protected areas, especially for new parks, which make it difficult to completely restrict their access to resources without compensation.

An effective management practice of protected areas is one of the best methods to achieve nature conservation in a given ecosystem (Amare, 2015) which requires an understanding of major factors that affect both the conservation and management of National Parks in Ethiopia.

1.2 The Purpose of the Article

➢   To review challenges affecting conservation and management of Eleven National Parks in Ethiopia.

➢   To review and suggest management strategies that can bring solutions to the problems in the protected areas.

2. Challenges

2.1 Lack of Sense of Ownership

Local communities are one of the stakeholders most affected by the establishment of National Parks (Kebede et al., 2014). Thus, local communities must be involved as equal partners in the development and implementation of conservation strategies that affect their lands, territories, waters, coastal seas, and other resources, and in particular in the establishment and management of National Parks (Beltrán, 2000). The success of the protected area management is entirely dependent on the acceptance and cooperation of local communities in conservation activities.

Even though the local community is participating in different activities of conservation and management of national parks in Ethiopia such as in, providing information about illegal activities in the parks (Gashaw, 2015), they are not involved with the park planning and management decisions (Asmamaw & Verma, 2013; Petros et al., 2015). This could create a better understanding among most society members that the park belongs to the government which in turn could affect the acceptance and cooperation of local communities in conservation activities of present and future as well as their sustainability, if local communities are fully compensated for their economic loss resulting from loss of access to natural resources.

2.2 Limited Awareness

Awareness creation should be the first action for any protected area conservation (Gashaw, 2015). That means the local communities should be aware of the environmental, social and economic importance of these areas before and after their establishment (Kebede et al., 2014). However, the National Parks in Ethiopia are facing problems due to the reason that the society settled around the parks have low awareness (Tesfaye, 2017) of the role of this conservation areas for environmental (soil erosion control and getting reliable rain fall in case of Bale

Mountain National park) (Asmamaw & Verma, 2013), biodiversity in case of Kafta-Sheraro National Park (Berihun, 2016), economic (ecotourism) in case of Awash National park (Alemayehu, 2011) and cultural value to the region and the country (Aneseyee, 2016). Low awareness of the community about the importance of national parks is also a problem that affects the eastern Ethiopian protected areas (Wale et al., 2017).

2.3 Population Growth

In Ethiopia, population growth is strongly influencing the conservation and management of national parks (Petros et al., 2016; Gashaw, 2015; Zerga, 2015). As a result of population growth, in National Parks of Ethiopia, existing settlements are growing and new settlements are appearing in previously unsettled and environmentally sensitive areas (for example Bale Mountains National Park (Gashaw, 2015), Awash national park (Zerga, 2015), Gambella National Park (Aneseyee, 2016), Simien Mountains National park (UNESCO, 2015). Population growth affects the conservation and management of national parks through land use conversion (conversion of natural vegetation cover to other use types such as farmland, grazing land, human settlements and urban centers) (Milner et al., 2007) since the increasing population density leads to increasing needs demands for agricultural land and forest products, thus forcing the people to clear woodland or natural forest for settlement and expansion of farmland, finally resulting in increased human-wildlife conflicts. Figure 1 A-D shows example of population growth trends within and adjacent Districts of some national parks of Ethiopia.
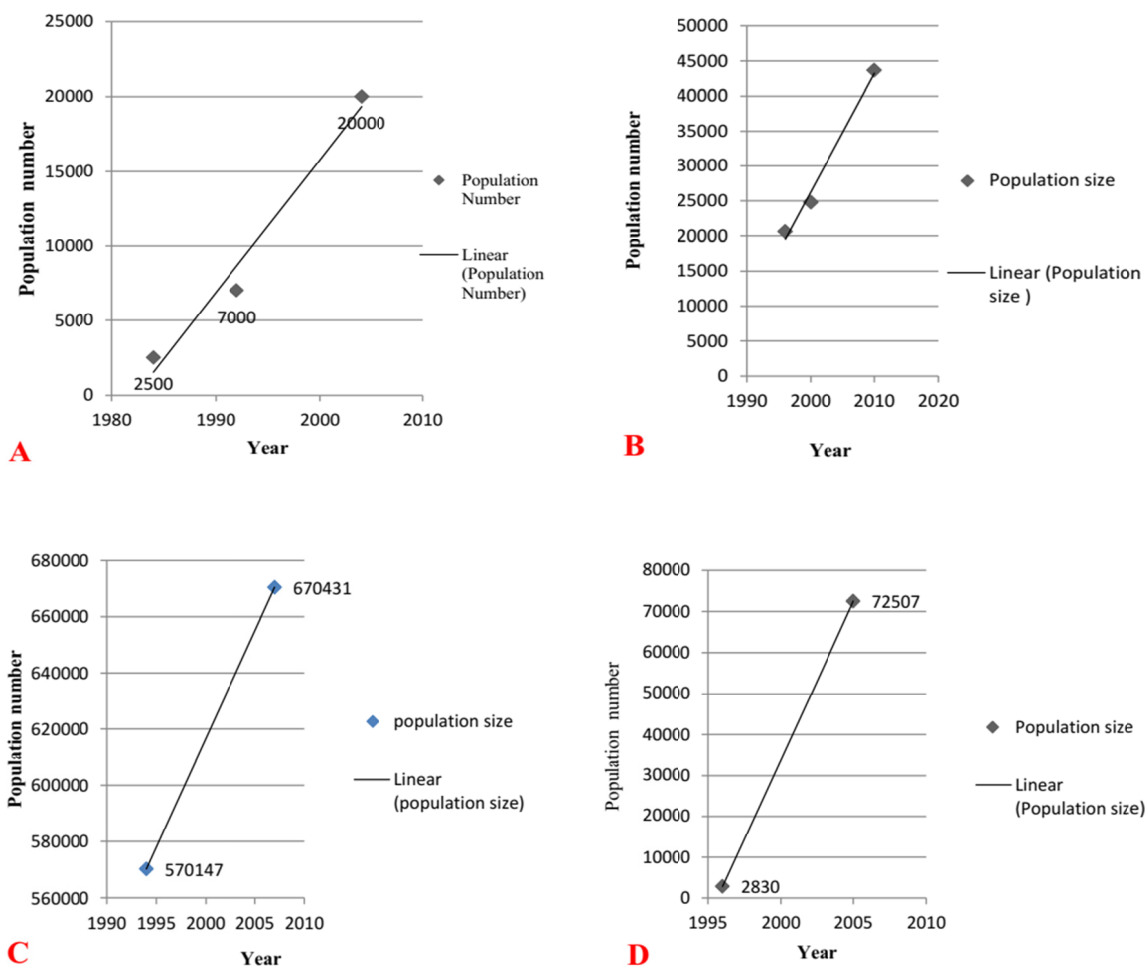

Figure 1. Population growth trend A) in Bale Mountain national park, source Flintan et al. (2008), B) in Abjata-Shalla-Lakes National park, source Senbeta and Tefera (2001), C) in Simien Mountain National park adjacent Districts, source UNESCO (2015), D) in Arba-Minch town which is the nearest town to Nechsar National park, source Elias (2003) as cited in Chanie and Tesfaye (2015)

2.4 Lack of Coordination

Stakeholders are people who are affected either negatively or positively or those who can affect the outcome of a proposed intervention (Karl, 2000). Stakeholders can be classified as primary stakeholders and secondary stakeholders based on their interest (direct or indirect) (FAO, 1998). Primary stakeholders are those who have a direct interest in the resource; either because they depend on it for their livelihoods or they directly involved in its exploitation; and the best examples are the local community and park management (Karl, 2000). Whereas, secondary stakeholders are those who have indirect interest in management and conservation of natural resources and /or depend at least partially on wealth or business generated by the resource and intermediaries in the process of delivering aid to the primary stakeholders; and the best examples are local government, cooperatives and higher education institutions (FAO, 1998; Karl, 2000).

The various stakeholders involved in National Park management in Ethiopia are local communities, park management, EWCA, local governments, NGOs, higher education institutions, cooperatives and the National Biodiversity Institute (Zerga, 2015; Gashaw, 2015; Amare, 2015; Girma & Gebreyes, 2015; Chanie & Tesfaye, 2015; Teferra & Beyene, 2014).

According to Gashaw (2015) and Zerga (2015), setting up of different objectives (including a difference in prioritizing objectives) and lack of mutual respect are some of the causes which may result in lack of coordination among stakeholders.

2.5 Conflicts Over Resources

Conflict characterizes a relationship between two or more parties who might have conflicting goals, values, interests, or behaviors (Teferra & Beyene, 2014). In case of the natural resource management, the outcome of competition and potential disagreement between two or more groups over the use of one or more scarce resources indicate conflict (Grimble, 1998). Therefore, conflicts within national parks can be seen to be the result of diverse interests, goals, and ambitions that individuals or groups within legally established and isolated environments have, which all too often resulted in either positive or negative impact on the use value of the resource in the area (FAO, 2000).

There are three categories of conflicts which are occurring in National Parks in Ethiopia, namely: (1) conflict between human and wild animals (Berihun et al., 2016), (2) conflict between park managers (scouts and staffs) and communities which live in and around national parks (Asmamawu & Verma, 2013), and (3) conflict between different communities surrounding the park (Ashenafi & Leader, 2005).

Human-wildlife conflict occurs across the globe (IUCN, 2005); however, developing countries are more vulnerable than developed counties (Berihun et al., 2016). The basic causes that have been suggested for the higher human-wildlife conflict in developing countries are poverty and the rapidly growing human populations and expanding settlements that cause habitat loss (Mwamidi et al., 2012). Resource use exclusion, an illegal activity made by local or external people (individually or in a group to access resources from the park), crop damage by wild animals are the causes of conflict between park managers and community (Asmamawu & Verma, 2013; Kebede, 2014; Berihun et al., 2016). Border and resource competition (*e.g.* for grazing land access) are some causes of conflict between different communities surrounding parks (Ashenafi & Leader, 2005; Mulualem & Tesfahunegny, 2016).

2.6 Issues of Boundary/Lack of Boundary

The boundary of a given national park is important to prepare its management plan and to put down possible conservation strategies of its area and it is also important to improve its management (Council of Ministers Regulations No. 163/2008). However, lack of a well-defined and mutually agreed upon border is among the challenges that affect the conservation and management of National parks in Ethiopia (Petros et al., 2016; Zerga, 2015; Teferra & Beyene, 2014).

2.7 Invasive Species

Invasive species is a global problem, where exotic species competes for resources and habitat, altering the physical environment in a way that sometimes causes competitive exclusion of native species with great economic and ecological consequences. In Ethiopia, there are about 35 invasive weed species (*e.g. Opuntia ficus-indica*, *Prosopis juliflora*, *Argemone mexicana*, *Lantana camera*, *Eichhornia crassipes*) so far identified which are posing negative impacts on native species (Mulualem & Tesfahunegny, 2016; IBC, 2014). In most of the Ethiopian national parks, there are visible impacts due to invasive species especially in Omo (*Opuntia*), Awash, Babile Elephant sanctuary (*Prosopis juliflora*, *Lantana camara*, *Parthenium hysterophorous*), Yangudi-rasa and Nechisar national parks (Young, 2012). Some of the invasive species were introduced in to the

country for agricultural or restoration purposes but resulted in negative consequences (*e.g. Prosopis juliflora* was intentionally introduced as an agroforestry species in the Awash basin, but now threatens agricultural land and protected areas in the Awash National Park) (GEF, 2005), as an uninvited exotic guest (HDRA, 2005).

2.8 Illegal Charcoal Production

Charcoal is one of the traditional fuels in Ethiopia. According to Guta (2012), charcoal production is a main economic activity and an important source of energy in developing countries in general and in Ethiopia in particular (Chanie & Tesfaye, 2015).

People use charcoal due to the fact that it is a cheap commodity that requires low priced, affordable and readily available metal or ceramic stoves in the market as compared to electric and gas stoves for cooking purpose (Luoga et al., 2000). Besides its uses, currently, charcoal production is causing a threat in conservation and management of national parks in Ethiopia (Chanie & Tesfaye, 2015; Yohannes et al., 2011; Berihun et al., 2016; Zerga, 2015; Teferra & Beyene, 2014). Figure 2 A-D shows example of illegal charcoal production within national parks of Ethiopia.

Figure 2. Illegal charcoal production in A) Awash National park, source Yohannes et al. (2011), (B-D) in Bale Mountains National Park from *Myrsine melanophloeos* (ex *Rapanea melanophloeos* at ca 3200 m) Photo by Maria Johansson

2.9 Climate Change

Climate change is having impacts on to the health of ecosystems and services they support (Keenleyside et al., 2014). According to IBC (2014), climate change is one of the main direct threats to Ethiopia's biodiversity which is caused due to an emission of greenhouse gases, deforestation, and unsustainable land use systems.

Currently, national parks and other conservation areas in the country are under risk due to the change in climate (Mekonen et al., 2017). Shifting of species movement and distribution (by reducing suitable habitat and increasing the rate of habitat fragmentation) and a rise of invasive species like *Acacia drepanolobium* can be mentioned as problems imposed on our national parks due to climate change (IBC, 2014). According to Biru et al. (2017), climate change is one of the causes that decreased pastoralist's livestock number of peoples which

live around Awash National Park; in future which may increase the people's dependency on the park for their livelihoods (Young, 2012).

2.10 Poverty

Ethiopia is one of the poorest countries in the world where low income and productivity, weak capital accumulation and investment, high levels of unemployment are the main features of the economy (Moges, 2013). Besides the presence of poverty, the country is one of the top 25 biodiversity-rich countries in the world; hosts two of the world's biodiversity hotspots namely: the Eastern Afromontane and the Horn of Africa hotspots (WCMC, 1994). However, currently, the country biodiversity is under threat and loss due to various reasons. According to IBC (2014), poverty is one of the reasons of biodiversity loss through people dependence directly upon consumption of biodiversity or other natural resources in the country.

3. Solutions

3.1 Develop Sense of Ownership

To increase or develop the sense of ownership in local communities the society should be involved in any decision making process (Tilahun et al., 2017) and consented for their agreement in any conservation effort made by the government, park management, and other responsible bodies. Because the society involvement in decision making will help to protect reserves from outsiders (by cooperating with park management) and also helps to regulate their own use of natural resources (Andrade & Rhodes, 2012), thus it will increase and /or develop a sense of ownership. Also by clearly indicating border of protected areas (lack of boundary is among the factors that decrease a sense of ownership) (Gebreyowhans, 2015) government (both federal and regional) can develop a sense of ownership within the community.

In addition to the involvement of the community in decision making, encouraging communities to develop their own business (economic empowerment), and initiation of infrastructural development by government and other stakeholders can help develop a sense of ownership within the community (Woyesa, 2016).

3.2 Awareness Creation and Development

In order to develop awareness of local people about the importance of conserving and managing National parks in Ethiopia environmental education programs should be given to the society (Aneseyee, 2016; Tesfaye, 2017) on continuous bases. Conservation education centers at each park that will help in raising awareness to the community should be established by Universities Research and Community Service in collaboration with park officials (Amare, 2015).

Participation of Mosques and Churches in creating awareness by teaching their followers should be encouraged since according to Tilahun et al. (2017), awareness creation effort conducted by Mosques and Churches for local people had resulted in a positive attitude in some areas (about the importance of conservation in Gibe Valley National Park).

Media's also can play a significant role in awareness creation and development (by demonstrating how healthy park ecosystems contribute to healthy local economies using experience from other countries) (Keenleyside et al., 2014).

3.3 Collaborative Approach and Consultation Among Stakeholders

The absence of coordination among different stakeholders affects the success of conservation activities (Stolton & Dudley, 1999). Thus, to solve conservation and management challenges which are caused by lack of coordination among different stakeholders, collaborative approach should be encouraged and/or followed (Petros et al., 2016) both in setting objectives and prioritizing conservation measures; because having different objectives by different stakeholders can create confusions; which may finally lessen effectiveness of those measures conducted by each responsible or interested body separately. There also should be consultation among different stakeholders (Zerga, 2015) which may in turn increase coordination.

3.4 Co-management and Resolution of Border Issues

Border issue should be solved as much as possible in all national parks in Ethiopia by the federal or regional government since border conflicts are treating the existence of many national parks within the country (Mulualem & Tesfahunegny, 2016). This may help to avoid conflict between communities since border issue is among the causes which are causes of conflict between communities (Ashenafi & Leader, 2005).

To avert the conflicts which are arising between wildlife and people, providing alternatives that meet the need of human population (for example helping people to increase their land and livestock productivity) is or can be a solution (Tefera & Beyene, 2014).

To avoid conflicts between park staffs and local communities, helping livestock owners to produce improved pastures (because these improved pastures improve local feed availability and may reduce the dependence of local community on the park) along with cereal crops on their plots can be a solution (Biru et al., 2017).

Also, Co-management systems should be established because they help in sharing of rights and responsibilities; and this may in turn help in avoiding conflicts and increase the success of conservation measures (Pomeroy & Berkes, 1997).

3.5 Reducing Free Grazing, Invasive Species Utilization, Care During Introducing and Biological Control

As it has been mentioned earlier there are a number of invasive plant species in Ethiopia, but in this review, we give focus to an invasive plant species which are causing huge loss to the biodiversity (*i.e. Prosopis juliflora*). Ethiopian Government has declared Prosopis to be a dangerous plant, which should not be cultivated or planted, and requires containment, control, management and ultimately its removal (MOLF, 2017). However, today a number of benefits have been realized from the species, for example: charcoal production, fence or house construction, livestock feed through mixing ground pods with livestock meal, soil conservation, nitrogen fixation in the soil, local microclimate amelioration, as a shade tree where it is able to grow to a tree, has also potential to serve for apiculture, woodchips, flooring and timber, and for using the biomass for fuel and the pods for livestock feed on a commercial basis (MOLF, 2017).

The problem in Ethiopia is that most *Prosopis* grows as bushy a thin-trunked shrub which is a limiting factor on its use, otherwise, most usefully its biomass on large scale can be used as a fuel source for industry (*e.g.* cement making industry) (MOLF, 2017).

Currently, in the country there are a number of non-governmental organizations who are supporting charcoal making from this invasive plant species which is an opportunity but at the same time it needs to be carefully controlled and monitored to ensure that it does not encourage the additional use of the indigenous trees for charcoal (MOLF, 2017).

As general direction for all invasive plant species, due attention should be given to the prevention of actual and potentially invasive alien species from establishing them in the national parks **(**Yohannes et al., 2011) and this is because of it may be difficult to eradicate them once they established (for example it is possible to take the case of *Prosopis juliflora*). Furthermore, as it has been discussed by Yohannes et al. (2011), great care should be taken while planting or introducing new plant species into the park areas. Even though, so far there is no binding legislation which regulates the use of alien species; national parks should have their own mechanisms to regulate the introduction of new plant species into the park to prevent the further establishment of invasive species.

Parks should reduce intensive grazing, since extensive and uncontrolled grazing can facilitate the establishment of invasive plants by trampling and defoliating established species, thereby reducing their competitive ability and creating bare patches, and by disrupting nutrient cycles (Kimball & Schiffman, 2003; Dorrough, et al., 2004).

In addition, utilization of plant species that can inhibit the growth of invasive species; insects and pathogens (such as the leaf feeding beetle *Zygograma bicolorata* in case of *Parthenium hysterophorus*) which is biological control method can help to manage the invasive species biologically (Mekonnen, 2017). Also awareness creation (mass awareness programmes should be organized, involving all park staffs, communities surrounding national parks) may help to make them aware of the dangers of the invasive species and their uprooting in national parks in which this species are causing a severe threat.

3.6 Reduction of Fuelwood Consumption and Increase Carbon Sequestration

According to CRGE (2012), reducing demand for fuelwood via the dissemination and usage of fuel-efficient stoves and/or alternative-fuel cooking and baking techniques (such as electric, LPG, or biogas stoves) leading to reduced forest degradation will have a positive impact on our effort of preserving biological diversity since preservation of Ethiopia's biodiversity of species is vital to mitigate the effects of climate change (Young, 2012). Increase afforestation, reforestation, and forest management to increase carbon sequestration in forests and woodlands also help to overcome the problem which may also reduce the pressures that peoples exert on national parks. Increasing the level of climate change mitigation mechanisms and awareness creation can also play a crucial role (IBC, 2014).

3.7 Improving Incomes, Institutional and Policy Reforms

Poverty is a multidimensional and dynamic phenomenon that has multiple causes and exhibit economic, social and political characteristics, and hence poverty reduction policies require multi-dimensional approaches and strategies (Moges, 2013). Therefore, addressing the problems of poverty in the country require efforts to improve production allocation efficiency and productivity; investment in human and physical capital; improving the distribution of resources and opportunities; and undertaking sound institutional reforms (Moges, 2013).

In addition improving agricultural productivity, diversifying livelihoods, and increasing and incomes of rural communities, sustainable biodiversity management such as participatory forest management that can improve benefits of local communities from forest resources through creating access to non-timber forest products (example honey, spices and medicine collection) (IBC, 2014) will help in poverty reduction which may in turn reduce people negative attitude as well as pressure on the country biodiversity in general and national parks in particular.

4. Conclusion and Recommendation

Lack of sense of ownership, limited awareness, population growth, lack of coordination among various stakeholders, conflicts over resources and issues of boundaries, invasive species, illegal charcoal production and climate change, and poverty are challenges which are affecting conservation and management of National Parks in Ethiopia.

Develop sense of ownership within community; awareness creation and development; collaborative approach and consultation among stakeholders; Co-management and resolution of border issues, which may avoid conflict; reduction of free grazing, invasive species utilization, care during introduction and biological control to prevent new establishment and further encroachment of new areas by invasive species; decreasing fuel wood consumption and increase carbon sequestration to avoid the problem of climate change; improving incomes, institutional and policy reforms that will help to avoid poverty are the suggested strategies that can bring solutions to the challenges of conserving and managing national parks in Ethiopia.

Acknowledgements

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