

Full Length Research Paper

Threats of biodiversity conservation and ecotourism activities in Nechsar National Park, Ethiopia

Solomon Chanie* and Dereje Tesfaye

Department of Biology, Arba Minch University, P. O. Box 21, Arba Minch, Ethiopia.

Received 06 June, 2014; Accepted 24 February, 2015

This study was carried out on the threats of biodiversity conservation and ecotourism activities in Nechsar National Park (NSNP), Arba Minch, Ethiopia. Data was collected from protection staffs and local communities found in and around the boundary of the national park. Open ended and close ended questionnaires, focused group discussion and field observation were used to collect all the necessary information. Protection staffs interview revealed that illegal fishing (100%), fuel wood collection (100%) and charcoal production (92.0%) were among the major problems of biodiversity in the study area. On the other hand, the data obtained from the villagers showed that 58.5 and 37.8% of them were involved in fuel wood collection and livestock grazing, respectively. Poor salary (96.0%), inadequate staffing (88.0%), lack of equipment (96.0%) and poor infrastructure (96.0%) were also among the major management problems that hinder the motivation of the park management staffs. Based on our research results, we could say that there is a rapid growing ecotourism activity in the study area. However, the long term effects of human threats to biodiversity had resulted and can have negative implications on the ecotourism activities and biodiversity of the study areas in the future.

Key words: Biodiversity threats, conservation, ecotourism, Nechsar national park.

INTRODUCTION

Biodiversity is the variety of life, in all of its many manifestations encompassing all forms, (plants, animals and microorganisms) and at all levels of biological organization which includes genetic diversity, species diversity and ecosystem diversity (Christ et al., 2003; Gaston and Spicer, 2004; Meduna et al., 2009; CBD, 2012). The earth's biodiversity constitutes valuable natural resources in economic, cultural, aesthetic, scientific and educational terms, providing enormous amounts of both monetary and non-monetary benefits to humankind (Groombridge, 1992; Howard et al., 2000; Hockings, 2003; Hockings et al., 2005; Leverington et al., 2010;

Kolahi et al., 2012). Nature conservation is among the top priorities of most members of the international community in the 21st century (Kolahi et al., 2012). Their conservation and management are critical to the interests of all nations and governments (Dudgeon et al., 2006). Protected areas (PAs) play critical roles in safeguarding biodiversity and maintaining the crucial services provided by the natural systems. They have an important role in the evolving challenge of maintaining a sustainable world (Borrie et al., 1998; Groombridge, 1992). Currently, more than 161,991 areas have been reported as PAs in the World Database of Protected Areas and the number

*Corresponding author. E-mail: alemu3@gmail.com; solomon.chanie@amu.edu.et

continues to increase (Kolahi et al., 2013). PAs have long been the only way to conserve ecological regions from the other forms of land use (EEA, 2010). For example, they have significantly lower rates of clearing compared to locations outside their boundaries and to conditions before they were gazetted, although clearing is still significant, especially in the African and Asian regions (Leverington et al., 2010; Nagendra, 2008). Protected areas are therefore the cornerstone of most national strategies to protect biodiversity and natural resources (Hockings et al., 2005; Leverington et al., 2010) playing a key role in the sustainable utilization and attainment of natural resources.

There is a growing evidence of critical biodiversity breakdowns both inside and outside of many PAs (Hockings et al., 2002; Dudley et al., 2004; Fischer, 2008; Butchart et al., 2010). Accordingly, many PAs are presently being degraded and destroyed (Hockings, 2003; Dudley et al., 2004). In most developing countries, PAs are under pressure from anthropogenic activities and lack proper management and maintenance (Kolahi et al., 2012). Overpopulation and overconsumption (Eldredge, 2002; Kolahi et al., 2012), habitat loss, fragmentation, and invasive species (Christ et al., 2003; Meduna et al., 2009), associated with socioeconomic problems and policy failures, weak government structure, policy, and legislation, low morale, and inadequate funds are underlying causes of biodiversity loss (Braatz, 1992; Eldredge, 2002).

Ethiopia is known for its faunal and floral diversity with an estimated 6500–7000 species of plants of which 2% are considered endemic (Tewolde Berhan, 1991; Mohammed and Ababu, 2003; Melaku Tefera, 2011). From the total land area coverage of the country, PAs such as national parks, sanctuaries, controlled hunting, open hunting, wildlife reserves and community conservation areas shares about 15% only (BIDNTF, 2010). These include 15 national parks, four wildlife sanctuaries, seven wildlife reserves and 18 controlled hunting grounds (Mohammed and Ababu, 2003; James, 2012). Despite these diversities, there have been many setbacks. The biodiversity of Ethiopia has recently received appropriate recognition. The majority of the country now falls into two Biodiversity Hotspots; the Eastern Afromontane Hotspot comprise over 50% Ethiopian Highlands and the Horn of Africa Hotspot in which greater than 40% of it falls within Ethiopia. However, these areas are among the most threatened Hotspots in the world in that an estimated 97% of the natural vegetation of Ethiopian Highlands has been lost. Consequently, status of protected areas in Ethiopia is reported to be relatively poor, exist on paper only (Jacobs and Schroeder, 2001; Solomon et al., 2012) and severely damaged during or after the civil war that brought the current government to power. Many studies revealed that livestock grazing and poaching are the major problems affecting biodiversity in the protected areas. Besides,

insufficient funding for park management and poor salary pay for protection staff could contribute limitations and less attention regarding the conservation of biodiversity (Meduna et al., 2009; Solomon et al., 2012).

Ecotourism has been considered as the impetus and economic investment for management of natural resources (Kolahi et al., 2013). Another important aspect of ecotourism is the encouragement of active participation by the local population in the conservation and education dimensions (Aramde et al., 2012). Currently, ecotourism is becoming the fastest growing segment of tourism. On a global scale, ecotourism is growing because of its international appeal (Lowman, 2004). An estimated 1.035 billion people from all cultures and all walks of life participate in different kinds of tourism, spending over US\$ 1.075 trillion (UNWTO, 2013) comprising 11% of world gross national product (GNP) if related activities 'tourism and general travel' are included (Roe et al., 2004).

The basis of Ethiopia's tourism product is cultural, historical and natural sites where the biggest challenge currently is to preserve the historic sites from natural decay and the national parks from degradation by the local communities that live around or inside them (World Bank, 2006). Although, Ethiopia currently ranks 19th among African countries in tourist destination, the long-term vision of the government is to make Ethiopia one of the top ten tourist destinations in Africa by the year 2020, with an emphasis on maximizing the poverty-reducing impacts of tourism, and utilizing tourism to transform the image of the country (World Bank, 2006).

NSNP, incorporates many biodiversity resources as well as supporting the livelihood of both the national and local users, and becoming a tourist destination, the value given for its protection and conservation development is very low. Smallholder farmers and pastoralists use the natural resources of for their livelihoods, mainly grazing land, firewood and fish. This promotes a continuous degradation of the park's ecosystems and its biodiversity. Invasive woody species are overrunning the Nechsar Grassland Plains on which the grazing wild animals depend. The government attempted repeatedly to address the problem by resettling people out of the park and to deter illegal resource utilization through law enforcement. The loss of wildlife and their habitats in the park have continued unabated despite the conservation efforts by the Ethiopian government. This research aims to identify biodiversity conservation problems or threats and their impacts on ecotourism activities in NSNP.

MATERIALS AND METHODS

Study areas

NSNP was established in 1974 covering an area of 514 km² (HOA And FFE, 2008), situated in one of the most scenic parts of the Ethiopian rift valley near Arba Minch town, about 500 km southwest of Addis Ababa, of which 85% is land and 15% is water (lakes

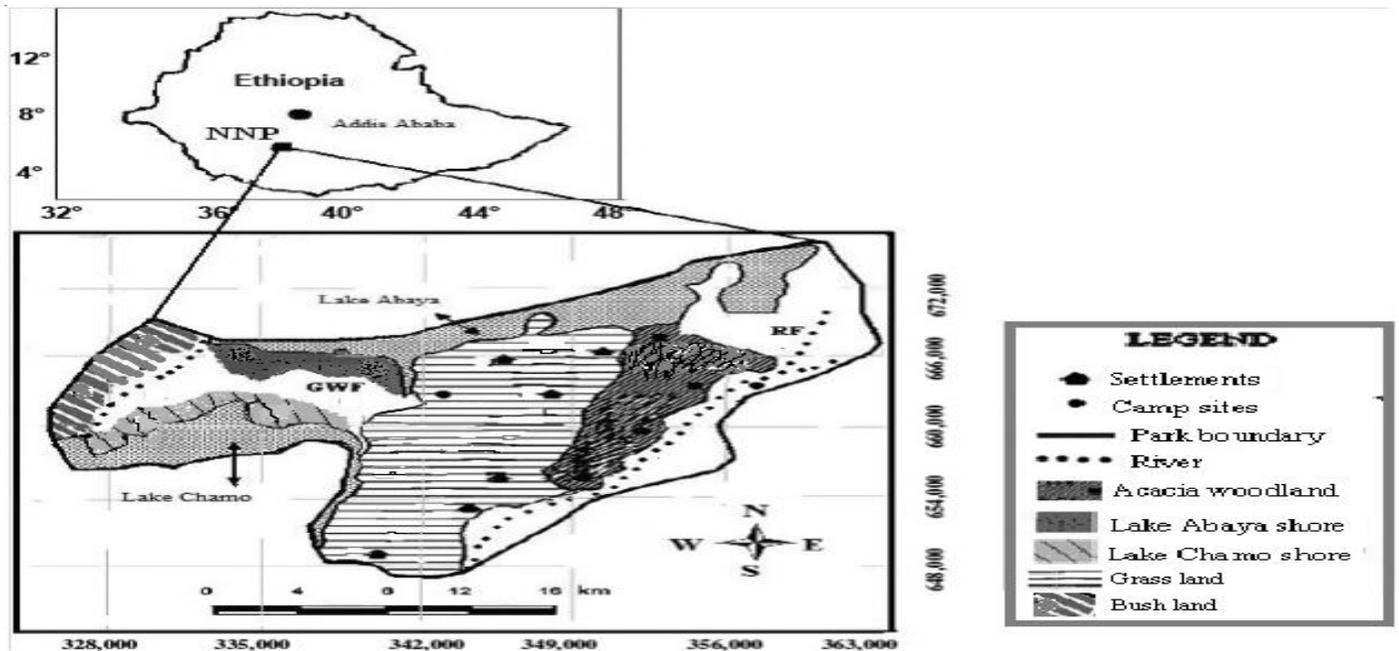


Figure 1. Map of the study area (GWF = ground water forest; RF = riverine forest).

Chamo and Abaya). Although it was designated in 1974, the Park has not yet been formally gazetted (Aramde et al., 2012). The park falls within one of the IUCN's global diversity hotspots (APF, 2007), namely the "Horn of Africa" and the original habitats of the park are highly degraded with only about 5% remaining. Annual rainfall follows a bi-modal system and averages 880 mm, mostly falling in March, April and May, and between September and November. The temperature ranges from 12.2 to 34.3°C. There is a great diversity of habitats in the park including Acacia woodland, bushland, grassland, ground water forest (with low ground water and diverse floristic make up), riverine forest, Lake Abaya shore and Lake Chamo shore (Duckworth et al., 1992; Yisehak et al., 2007; Sintayehu et al., 2011). Generally, the park is regarded as one of the most degraded hotspots in the world (Figure 1).

Data collection and sampling procedure

Three main techniques of data collection were used for this research. These were, semi structured interviews, questionnaires and focus groups discussions including direct observation. The study area was divided into different villages based on the ranges established by the management of the local Peasant Association (PAs). Two types of questionnaire were designed for the study. The first type was for the villagers, while the second type was for the park protection staffs of the national park. The questionnaire for villagers had two sections: demographic characteristics and checklist of illegal activities that were carried out by them inside or at the boundary of the national park while the questionnaire for staffs comprised the illegal activities that they have encountered in the park (Meduna et al., 2009). A total of seven peasant associations were located at the proximity of namely, Sile in the south west part of the park, Amaro in south east, Guji I and II in eastern part of the park and People at the vicinity of Arba Minch town in the western parts of the park. Each PA is further subdivided into villages, depending on its size; one association can

have 6 to 10 villages. Among those villages, we only selected two villages found at the vicinity of the National park having direct interaction and knowledge on what is going on to the NSNP by the residents of these villages. Then, 10 individuals were interviewed from each village so that a total of 14 villages were represented for this particular research. From each 13 villages, we have interviewed and made discussion with 10 individuals, a total of 130 individuals, except one small village the western boundary of the NSNP, *Secha area*, where we could have got only 5 voluntary people for interview, making our total representative sample to be 135. Additionally, all 25 protection staffs were subjected to questionnaires and interview. Lastly, the record of illegal activities or arrest made and tourism flow from 2002-2011 (10 years) by the park were obtained from the park management office.

RESULTS

The demographic characteristics of villagers interviewed are shown in Table 1. It reveals that 65.2% of the villagers were male while 34.8% were female. Moreover, most of the respondents were farmers/semi-pastoralists (47.4%), civil servants (18.8%) and students (15.6%). This is an indication that the dominant occupations in the study area are farming and livestock herders.

Table 2 shows the results of illegal activities that have been carried out by villagers. Fuel wood collection (58.5%) was recorded as the peak threat to NSNP. There are also major threats to the national park, which includes illegal fire (37.0%), deforestation (37.0%), livestock grazing (37.8%) and charcoal production (28.9%). The study indicates the problems affecting biodiversity conservation in NSNP which were identified by protection

Table 1. The demographic information of the respondents in NSNP (n=135).

Variables	Nechsar NP Percentage
Gender	
Male	65.2
Female	34.8
Occupation	
Farmers/Semi-pastoralists	47.4
Civil servant	18.8
Contract Worker	5.9
Driver	0.7
Merchant	5.2
Student	15.6
Jobless	7.4

Table 2. Comparison of respondents result on the illegal activities to the NSNP carried out by the villagers (n=135) as identified by protection staff (n=25).

Variables	Value in percentage	
	Protection staff	Villagers
Livestock grazing	76.0	37.8
Illegal fire	84.0	37.0
Deforestation	76.0	37.0
Poaching	80.0	9.6
Fuel wood collection	100.0	58.5
Charcoal Production	92.0	28.9
Settlement	72.0	9.6
Illegal fishing	100.0	44
Grass cutting	88.0	40

n indicates the total number of interviewed respondents.

staff (Table 2). The result has showed that illegal fishing (100%), fuel wood collection (100%), charcoal production (92%) and grass cutting (88%) as the major threats for NSNP.

The illegal acts that have been recorded for the past ten consecutive years (from 2002 to 2011) by protection office are presented in Figure 2. The highest record of illegal acts (90 records) in the National Park was recorded in 2008. This was due to the fact that the 2008 was the final year when the African Parks Network (NGOs) has loosened and left its eight years contract agreement of the park (which was signed in 2005) for its own protection, with the Ethiopian government due the climax threat of the park by the local communities, the Gugi tribes, dwelling and interrupting the health conditions of the park through interference of their massive cattle herd along the wildlife and other illegal activities. Then, the park again has become under the control of federal government and the local administrative

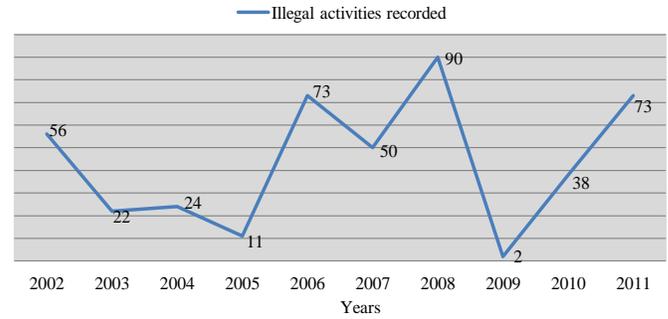


Figure 2. Rate of recurrence of illegal activities recorded by the conservation staff in NSNP (Source: Nechsar National Park annual report, 2012).

zone, Arba Minch in 2009. In this year, the climax was highly reduced (only 2 records) as the result of serious controlling measures taken by the government in collaboration with park management staff, against the illegal acts of the villagers. However, the previous trend of threatening biodiversity of the park has been increasing since 2010, as result of poor managerial activities. The most common management problems affecting biodiversity conservation in the national park are shown in Figure 3. The interview of protection staff indicated that poor salary, lack of equipment and poor infrastructure contributed equal weight (96.0%) as most common management problems affecting biodiversity conservation in the national park and was followed by inadequate staffing (88.0%).

DISCUSSION

Our research finding, on biodiversity conservation threats, which includes and mainly identified in our study as human settlement, deforestation or fuel wood collection and charcoal production, livestock grazing and/or grass cutting, poaching and fishing activities, and their impacts on ecotourism activities, has given emphasis to the information obtained from the respondents of the park's protection staffs and experts which were really concerned about the safety and health condition of the park than to the local people who were rather for the many causes of threats to the biodiversity of NSNP in many aspects. This discussion are based around issues of conditions of NSNP management, information about threats of biodiversity conservation within and their impediment to ecotourism sector.

Regarding conditions of the NSNP, since the time of its designation as a national park in 1974, it has experienced fundamental and repeated changes in its formal organizational status through different regimes of the country. However, the transitional period (after the Derg regime changed in 1991), was the time when the park's natural resource degradation was accelerated most as in

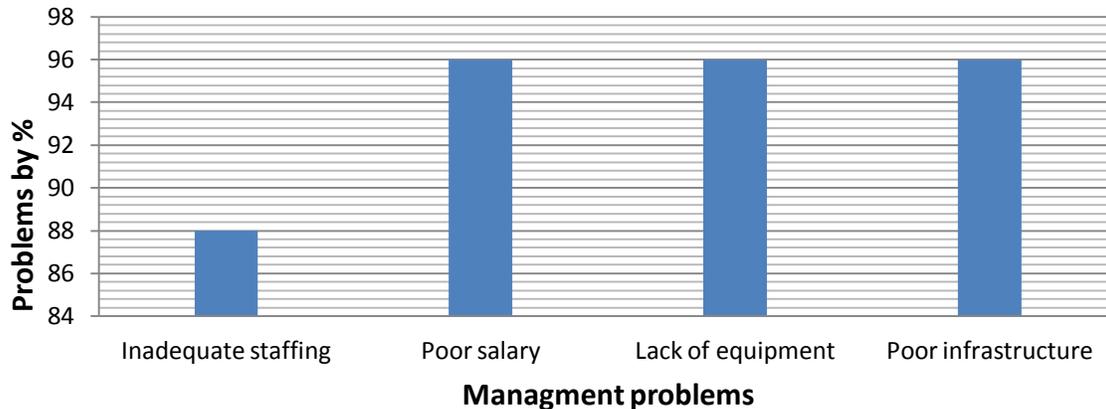


Figure 3. Management problems affecting biodiversity conservation in NSNP identified by protection staffs (n=25).

other protected areas of Ethiopia (Girma Kelboro and Stellmacher, 2012). After a long history of destruction of the NSNP, the responsibility for the technical park management and the establishment of collaborations with stakeholders was handed over to the non-governmental international conservation organization, African Parks Network (APN) or African Parks Foundation in February 2005 for 25 years, based on an agreement signed between the Federal Ministry of Agriculture, the SNSNPRS President's Office and APN. The engagement of APN in NSNP management during 2005 to 2008 led to a dramatic improvement of the human and financial resources which resulted efforts for the reinstatement and restoration of the park (Figure 2). As result, increased personnel capacity and extra payments, particularly of the scouts, had contributed to better control illegal activities in the park. Unfortunately, inability not to resettle the three local groups; Guji, Gamo/Ganta and Kore (Girma Kelboro and Stellmacher, 2012) to areas outside the park boundaries added to the complication of the park's management by APN.

Consequently, APN was unsatisfied by the failure of resettlement and it disrupted the agreement in 2008, stopped all its activities in NSNP and withdrew from Ethiopia. Since then, the biodiversity threats rejuvenate and persist till now (Aramde Fetene. et al., 2012). Very soon, the financial as well as human resources employed for the management of the park has got reduced in the consecutive years later, except some modification in the year 2013 and 2014 as observed during the study of this research (Table 3). Recent studies also showed that the population size of Arba Minch town has greatly increased from 2,830 in 1966 to 72,507 in 2005 (Elias, 2003; CSA, 2005; Aramde Fetene, 2011) which aggravated the threatening condition of the park.

Many studies have revealed that human settlement to natural habitat had a profound impact on wildlife communities. Species richness could decline as the level

of development on the surrounding natural habitat has increased (Miller et al., 2003; Meduna et al., 2009) through the modification of vegetation structure and composition. This was the case for NSNP which was surrounded by agricultural communities from its eastern and western boundaries. This made it more vulnerable to settlement which has created worries for 72.0% of protection staffs interviewed (Table 2). These illegal settlements within the park's territory were in fact the main reasons for the failure of the park management agreement (Girma and Stellmacher, 2012).

According to Population Action International (1999) and WHO (2006), more than three billion people worldwide depend on solid fuels, including biomass (wood, dung and agricultural residues) and coal, to meet their most basic energy needs where Ethiopia, with greater than 95 percent of its population is using solid fuels. This is a particular case of developing countries which are primary users of fuel wood thereby contributing 75% of forest harvesting (FAO, 2000). It is a fact that charcoal and fuel woods are the principal traditional fuels in Ethiopia, in general and in the study area in particular. World Bank (2011) reported that production of charcoal and fuel wood is the primary driver of deforestation and subsequent land degradation due to extensive agriculture, and these were the major threats observed in NSNP. The study of Bearer et al. (2008), also showed that fuel wood collection can be potential threat which is capable to dramatically reduce the total amount of forestland around the world.

The result of our study also found the major challenges to NSNP where 58.8% of the villagers were involved. All of the protection staffs (100%) interviewed agreed on seriousness of the threat. Due to its vicinity to Arba Minch town where there was high demand for fuel wood, NSNP is highly vulnerable to fuel wood collection where most of the city residents are dependent on it as energy source for cooking with no other energy source for cooking in the

Table 3. Personnel of NSNP before APN (under government administration), during APN and after APN (under government administration).

Positions of the NSNP personnel	2004	During APN (2005-08)	2009/10	2011/12	2013/14
Warden	1	1	1	1	1
Project coordinator	-	1	-	-	-
Community coordinator	-	1	-	-	-
Expert	1	-	-	1	2
Medium level wildlife and habitats expert	-	-	-	-	1
Junior wildlife and habitats expert	-	-	-	-	1
Community wildlife expert	-	-	-	-	-
Tourism expert	-	-	-	-	1
Scout	25	60	39	40	42
Support	14	19	15	15	17
Total	41	82	58	58	60

Source: NSNP archives.

town.

The present study shows deforestation, through fuel wood collection and charcoal production (for cooking purpose and house building), followed by grass cutting and illegal fire were the prominent threats to NSNP. This was mostly exercised by the poor local communities as a means of their livelihood via selling and this was discussed and agreed by 76.0% of the park experts. Illegal poaching and settlement and domestic animal grazing were additional challenging problems clearly seen in our present study. The widespread use as well as potential harvesting of forest products can have impacts on forested landscapes and wildlife habitats (Bearer et al., 2008). Our findings are supported by the very recent report of Steve Sepp by which in many developing countries, the demand for wood fuel destroys forests around urban and semi-urban agglomerations, resulting from unsustainable management practices and inefficient conversion and combustion technologies (Steve, 2014).

Even though charcoal production is an important economic activity and an important source of energy in developing countries (Dawit, 2012), it is being however conducted informally without any license (Million Bekele, 2011) and it was recorded as proved by 92% of the protection staffs (Table 2). According to the result of the study, the local people involved in charcoal production (28.9%), posed a threat which is mainly for commercial purposes. The research done by Mulat et al. (2004), proved that charcoal making and selling is a major non-farm employment along the main roads of the country which exposes the fragile ecosystem for severe deterioration. On the other hand, charcoal 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). Related studies have also proved that protected

areas found near towns can be badly affected (Monela et al., 1993; Steve, 2014) due to the fact that fuel wood products is more economically rewarding near urban areas (Benjamin et al., 2011).

Grass cutting for fodder and house construction (88%) followed by overgrazing (76%) were approved as the third challenging problems diminishing the abundance of wild life forage "*nechsar grass*" there by threatening the grazers biodiversity such as the Burchell's zebra (*Equus burchellii*), and Grant's gazelle (*Gazella granti*) in which NSNP was primarily established and is known for. This event might pose a problem since it results direct resources competition with the wildlife (Table 3). Across the world, there is clear commonality in at least some of the themes being addressed such as the issues of grazing, invasion, growing agricultural demands, climate change and management problems for biodiversity conservation (Watkinson and Ormerod, 2001). The recent study of Aramde et al. (2011) also identified that grazing deteriorates the scenery and the wildlife visibility, diminishing greatly over time, and finally disappeared, putting impediment for the income generating from ecotourism activities. Regarding this, particularly of domestic animal grazing, NSNP was surrounded by agrarian settlements which could alleviate the problem of overgrazing as ascertained by 76 % of protection staff. Huge flocks of cattle were observed grazing together with wild animals inside the territory of national park. As the result, livestock grazing has put frequent conflicts between the farmers and the park managers in the area.

Illegal fire has effects on biological diversities and ecosystem function by damaging habitats, breeding site and food causing the loss of wildlife, the territorial birds and mammals from their natural homes (Bowman and Murphy, 2010; CBD, 2010). The result of our study also revealed that uncontrolled fire has contributed a potential

conservation challenges, as agreed with 84% of the park management respondents, in the study area.

Poaching was reported by most of the protection staffs (80%) as one of the hard biodiversity threats to control. This is supported by a survey conducted within 2001 parks from different tropical countries of three continents indicated that poaching is the leading among the list of problems in over 85% of the parks (Gubbi, 2003; Dobson and Lynes, 2008; Kolahi et al., 2012). Poaching is also related to the roles of wild animals in some cultural ceremonies and tradition like marriage of the local tribes (Onadeko, 2004). However, the discussion made with local people has agreed on their involvement in poaching for bushmeat as alternative source of protein. The main reasons for poaching can be profits derived from the sale of wildlife parts and obtaining a trophy specimen for personal use thrill killing, necessity of obtaining food, and antagonism toward the government which were also observed in our current study.

Moreover, NSNP is partly consisted of aquatic habitats, lakes Chamo and Abaya, which were vulnerable to uncontrolled fishing activities. The interviews (100%) made with NSNP protection staffs revealed that illegal fishing was one of the most difficult activities threatening the lakes fish diversity. It creates significant collateral damage to ecosystems which may aggravate bycatch and incidental mortality of aquatic animals (Agnew et al., 2009). It contributes to overexploitation of fish stocks mainly in a region with poor governance and it has often been linked to organized crime (Vaisman, 2001). This was one of the threats for NSNP, which may probably result from weak governance system, causing a continuous, non-selective overexploitation of fishes in both lakes. This has led to the overall weakening of lakes' productivities by affecting the cascade of aquatic trophic dynamics. This situation had not shown significant change in terms of number of arrests made on illegal activities each year in both study areas where the number of arrests made in 2011 was higher than in 2010 (Figure 2).

Correspondingly, annual expenditure on protected areas in many developing countries is extremely low (Jones, 2005; WWF, 2007) and protected areas in tropical regions are under-funded even though they require resources for annual operating budgets, capital investment, staff-training, community development and public awareness among a wide range of other activities (Jones, 2005). All these gaps were also seen as a major management challenges for protection staffs of NSNP in our study (Table 2). The work of Ogunjinmi et al. (2009), reported low salary as one of the variables hindering rangers or protection staffs not to be employed in protected areas and satisfied with their job leading them to poor commitment to protection activities.

Over the past six decades, tourism has experienced continued expansion and diversification, becoming one of the largest and fastest-growing economic sectors in the world (UNWTO, 2013). Similarly, ecotourism has shown

considerable growth in our study area, NSNP (Table 3) which has a potential to host the ecotourism resourcefulness and a number of international and local tourists are interested to visit the park every year. The number of tourists and the revenue collected has shown considerable increments from year to year (Table 3). It has increased ten times in the last decade from one hundred and fifty three thousand, two hundred and fifty-five Ethiopian birr (153,255 ETB) in 2002 to one million, three hundred and thirty one thousand, five hundred and thirteen Ethiopian birr (1,331,513 ETB) in 2011. Besides the increase of ecotourism revenue, the local communities did not receive any incentives, which might pose challenges to protected area and put a limitation on ecotourism as a good alternative for conservation by providing substantial incentives to the host communities (Kolahi et al., 2013).

Conclusion

Current issues related with protected areas in Ethiopia require special attention in the light of the unabated population growth, correlated encroachment and misuse and abuse of natural resources (IBC, 2010). According to UNEP (2010), despite good framework and legislation for natural resource management, the implementation on the ground in Ethiopia was affected by limited participation of stakeholders. NSNP, a jewel in the crown of Ethiopia's National Parks, is valued for its physical beauty, endemic species, and diversity ranging from lakes to mountains. However, there have been disastrous reductions and changes in Ethiopian's ecosystems. In our case study, lack of a suitable PAs information database, limited public participation, inadequate provision of facilities, shortage of protection staff and park experts, poor infrastructure, low salary and persistent local people conflicts between park management officials or the government for settlement and other livelihoods were identified as the major problems for biodiversity conservation works in NSNP.

As a result, NSNP biodiversity is being lost by mismanagement, increasing competition for settlement, deforestation (fuel wood collection and charcoal production), overexploitation (in our case, overgrazing and overfishing), and illegal hunting or poaching, aggravated by insufficient staff and human resources, and budget constraints. These things had put a pronounced burden on the ecotourism industry. The fact that National Parks in Ethiopia are experiencing low visitation is a pointer to the debilitating effect of these problems on ecotourism activities, economy of the local people and that of the country as a whole. Despite a progress increment in the number of visitors as well as revenue generated from NSNP, for the past decades, there has been a decreased tourist visit record in the past two years (2013 and 2014); this was partially due to frequent conflicts in the utilization of the park resources and a diminished number of wildlife which were meant for

recreation a cause for visit (personal communication with NSNP manager, 2014). These problems emanated from socio-economic cum total dependency of local communities and peoples of Arba Minch town as their livelihood on the park. In addition, low priority is given to conservation programs by the three tiers of government (Federal, State and Local Governments) which means they are not communicated either in the top-down nor down-top system.

With this fast rate of deforestation, and other threats, the environment will reach to the point where it cannot support the community, the wild animals and ecotourism activities will stop, leaving Arba Minch town to be bounded to face some serious problems in their livelihood. Therefore, integrated forest and wildlife management with the involvement of all stakeholders may be used as a strategy to conserve NSNP and associated resources in a sustainable way.

Recommendation

Ethiopian biodiversity conservation is in dire straits. Neither the federal Ethiopian wildlife conservation authority (EWCA) nor the regional states offices can succeed by themselves to achieve the minimum required programmes to be successful. As a minimum, EWCA and the regional offices could have a joint management commission for the entire EPAS, where they could jointly work out practical solutions to the most urgent problems. The ensuing results of deforestation, grazing cattle, human habitation and overfishing in the park have caused severe stresses and degradation of park's ecosystems, leaving the sustainability of NSNP's resources in question. As result, income generated from the ecotourism is being negatively affected. The income from NSNP in terms of park entrance fee is higher as compared to other national parks with similar management scheme, was very high which is a reflection of its being unique tourist destination place. However, it was only from the park entrance fee, and should also include other income generating opportunities such as accommodation charges, visitors guide fees, food and drinks and from various activities so as to upgrade the park's infrastructures and other management facilities.

National parks management agencies require new strategies to curb illegal activities in the NSNP. It is obvious that the traditional measures such as arrest and prosecution of poachers or fuel wood collectors have failed and therefore, conservation awareness aimed at changing local attitude will go a long way in reducing incessant threat on the integrity of the park's biodiversity. Kohlai et al (2012) supported the public participation, awareness and transparency in decision-making as a great importance in conflict resolution and sustainable management in PAs. Similar researches also approved for the reason that local communities' participation in

tourism benefit-sharing is central to tourism development and biodiversity conservation (Kolahi et al., 2012) reinforced by other activities such as creating awareness, training and environmental education (Knapp, 2000; Bettinger et al., 2010). Another important recommendation we should forward is to reconsider or involve, but with a great governmental or regional support not to fail, the international or local NGOs, corporations, conservation trusts, local communities, and the private sector to take over NSNP management duties, for example, as it was tested and successful by APN for some years. This is because, these organizations have more autonomy in finances and decision-making, compared to government bureaucracies, and have proven to be successful models for managing PAs in many parts of the world (ICEM, 2003; Kolahi et al., 2012). This is to mean that the government should negotiate with landowners, pastoralists and other stakeholders inside or around to NSNP, to move outside and resettle them in other areas, through ensuring a commitment to sustainability. A new paradigm of human-centered conservation is becoming a standard approach in many countries (Phillips, 2003) as a tool for social planning and income generation (Locke and Dearden, 2005). Therefore, we can make conservation efforts more systematic and efficient through active management, legal, political and financial support from upper levels of government (Kolahi et al., 2012) to the regional states and local communities where the real protection and management activities takes place through efficient and systematic planning and policy instruments that allow integrated, sustainable ecosystem management. This would fantastically allow the many paper parks of Ethiopia including NSNP to become real working PAs that succeed in biodiversity conservation, as it was supported by the research work of Kolahi et al. (2012) and Kolahi et al. (2013). Moreover, on a local level, establishment of management committee would also be promising, in which local stakeholders would be represented, including one or more representatives from the regional government, local communities, local tourism facilitators (hotels, tour operators) and the biology department of Arba Minch University. The last but not the least we should commend is that because of the need for many studies, research institutions, universities, and students should be encouraged and strengthened with full material, finance and training capacities to conduct more intensive similar researches to assess and narrow problem gaps, the threats to NSNP thereby reassuring ecotourism activities for its long term sustainability.

Conflict of interests

The authors did not declare any conflict of interests.

ACKNOWLEDGEMENTS

We would like to express our gratitude to all those who

gave us the possibility to complete this paper. The authors are indebted to Arba Minch University at the first place for being the budget source of our research and other facilities. Secondly, we would like to forward our gratitude to the Ethiopian Wildlife Conservation Authority (EWCA) for giving permission to conduct this study in the National Park. Our grateful acknowledge will reach, in the third place, for NSNP management staffs, the scouts, and other people in the study areas for their continuous help and cooperation in providing all essential information in our study.

REFERENCES

- Agnew DJ, Pearce J, Pramod G, Peatman T, Watson R, Beddington JR, Pitcher TJ (2009). Estimating the Worldwide Extent of Illegal Fishing. *PLoS ONE*. 4:1-8. <http://dx.doi.org/10.1371/journal.pone.0004570>
- APF (2007). African Parks Foundation Annual Report, 2007.
- Aramde F, Girma M, Tsegaye B (2011). Spatial distribution and habitat preferences of selected large mammalian species in the Nechisar National Park (NSNP), Ethiopia. *Nature and Science*. 9:80-90.
- Aramde F, Girma M, Tsegaye B (2011). Spatial distribution and habitat preferences of selected large mammalian species in the Nechisar National Park (NSNP), Ethiopia. *Nature and Science*. 9:80-90.
- Aramde F, Tsegaye B, Pananjay GBG, Tiwar K (2012). Impact of Human Activities on Ground Water Forests of Arba Minch: A Case Study from Ethiopia. *International J. Basic Appl. Sci.* 1:54-60.
- Aramde F, Tsegaye B, Pananjay GBG, Tiwar K (2012). The Contribution of Ecotourism for Sustainable Livelihood Development in the Nechisar National Park, Ethiopia. *Intl J. Environ. Sci.* 1:19-25.
- Bearer S, Linderman M, Huang J, An L, He G, Liu J (2008). Effects of fuelwood collection and timber harvesting on giant panda habitat use. *Biol. Conserv.* 141: 385-393. <http://dx.doi.org/10.1016/j.biocon.2007.10.009>
- Benjamin TA, Margaret AA, Aaron AA (2011). Charcoal production in Gushegu District, Northern Region, Ghana: Lessons for sustainable forest management. *Intl. J. Environ. Sci.* 1:1944-1953. ISSN 0976-4402.
- Bettinger P, Boston K, Siry JP, Grebner DL (2010). *Forest Management and Planning*. Academic Press.
- Biodiversity Indicators Development National Task Force (2010). *Ethiopia: Overview of Selected Biodiversity Indicators*. Addis Ababa. pp. 48.
- Borrie WT, Stephen FM, Stankey GH (1998). Protected area planning principles and strategies. In: Lindberg K, Wood ME, Engeldrum D (eds), *Ecotourism: A guide for Planners and Managers*. vol. 2, The Ecotourism Society, North Bennington, p 133.
- Bowman DMJS, Murphy BP (2010). *Conservation Biology for All: Fire and biodiversity*. Oxford University Press Inc., New York. Pp 163. <http://dx.doi.org/10.1093/acprof:oso/9780199554232.003.0010>
- Braatz SM (1992). *Conserving Biological Diversity: A Strategy for Protected Areas in the Asia-Pacific Region* World Bank Technical Paper. Asia Technical Department Series. World Bank, W.D.C.
- Butchart SHM, Walpole M, Collen B, van Strein A, Scharlemann JPW, Almond REA, Baillie J, Bomhard B, Brown C, Bruno J, Carpenter K, Carr GM, Chanson J, Chenery C, Csirke J, Davidson NC, Dentener F, Foster M, Galli A, Galloway JN, Genovesi P, Gregory R, Hockings M, Kapos V, Lamarque J-F, Leverington F, Loh J, McGeogh M, McRae L, Minasyan A, Morcillo MH, Oldfield T, Pauly D, Quader S, Revenga C, Sauer J, Skolnik B, Spear D, Stanwell-Smith D, Symes A, Spear D, Stuart S, Tyrrell TD, Vie JC, Watson R (2010) Global biodiversity: indicators of recent declines. *Science*. 328:1164–1168. <http://dx.doi.org/10.1126/science.1187512>
- CBD (2010). Goal 1.4: To substantially improve site-based protected area planning and management, <http://bit.ly/ZyCWF8>.
- CBD (2012). Report of the eleventh meeting of the conference of the parties to the convention on biological diversity. Convention on Biological Diversity, Hyderabad.
- Christ C, Hillel O, Matus S, Sweeting J. (2003). Tourism and Biodiversity: Mapping tourism's global footprint. *Conservation International* Pp 66.
- CSA (2005). *Population Census of Ethiopia*. Central Statistical Authority. Addis Ababa, Ethiopia.
- Dawit D (2012). Assessment of Biomass Fuel Resource Potential And Utilization in Ethiopia: Sourcing Strategies for Renewable Energies. *Intl. J. Renewable energy Res.* 2:131-139.
- Dobson A, Lynes L (2008). How does poaching affect the size of national parks? *Tren. Ecol. Evol.* 23:177-180. <http://dx.doi.org/10.1016/j.tree.2007.08.019>
- Duckworth JW, Evans MI, Safford RJ, Telfer MG, Timmins RJ, Chemere Zewdie (1992). *A Survey of Nechisar National Park, Ethiopia*. Report of Cambridge Ethiopia Ground-water Forest Expedition, 1990. ICB Study Report No.50. Cambridge. United Kingdom.
- Dudley N, Hockings M, Stolton S (2004). Options for guaranteeing the effective management of the world's protected areas. *J. Environ. Policy Plan* 6:131-142. <http://dx.doi.org/10.1080/1523908042000320713>
- Eldredge N (2002). *Life on earth: an encyclopedia of biodiversity, ecology, and evolution*. Volume 1 A–G, ABC-CLIO, Inc. California.
- Elias E (2003). Socio-economic data of Agriculture and Natural Resource, Agricultural Development, Gamo Gofa Zone of SNSNP.
- European Environment Agency (EEA) (2010). 10 messages for 2010: protected areas. European Environment Agency, Copenhagen
- Farhadinia M, Hemami MR (2010) Prey selection by the critically endangered Asiatic cheetah in central Iran. *J. Nat. Hist.* 44(19-20):1239-1249.
- FAO (2000). *Global Forest Resources Assessment (FRA 2000)*. Food and Agriculture Organization of the United Nations, Rome.
- Fischer F (2008). The importance of law enforcement for protected areas: don't step back! Be honest protect! *GAIA Ecol. Perspect Sci Soc* 17:101-103.
- Gaston KJ, Spicer JI (2004). *Biodiversity: an introduction*. 2nd Edition. Blackwell.
- Girma K, Stellmacher T (2012). Contesting the National Park theorem? Governance and land use in Nechisar National Park, Ethiopia. Center for Development Research, University of Bonn, ZEF Working Paper Series, ISSN 1864-6638.
- Girma K, Stellmacher T (2012). Protected Area Governance: Lessons Learned from NGO Endeavors in Nechisar National Park, Southern Ethiopia. Center for Development Research, University of Bonn, Walter Flex Str.3, 53113 Bonn, Germany.
- Groombridge B (ed) (1992). *Global Biodiversity Status of the Earth's Living Resources*, A Report compiled by the World Conservation Monitoring Centre
- Gubbi S (2003). *Wildlife on the run*. www.wildlifefirst.info/images/wordfiles/ontherun.doc
- Hockings M (2003). Systems for assessing the effectiveness of management in protected areas. *Bioscience* 53:823-832. [http://dx.doi.org/10.1641/0006-3568\(2003\)053\[0823:SFATEO\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2003)053[0823:SFATEO]2.0.CO;2)
- Hockings M, Leverington F, James R (2005). Evaluating management effectiveness. In: Worboys GL, Lockwood M, De Lacy T (eds) *Protected Area Management: Principles and Practice*. Oxford University Press, South Melbourne, pp 553-573.
- Hockings M, Stolton S, Dudley N (2002). *Evaluating Effectiveness: A Summary for Park Managers and Policy Makers*. World Wide Fund for Nature (WWF) and IUCN, Gland.
- Howard PC, Davenport TRB, Kigenyi FW, Viskanac P, Baltzer MC, Dickinson CJ, Lwanga J, Matthews RA, Mupada E (2000). Protected area planning in the tropics: Uganda's national system of forest nature reserves. *Conserv Biol* 14:858-75. <http://dx.doi.org/10.1046/j.1523-1739.2000.99180.x>
- IBC (2010). *CBD 4th Country Report*. Addis Ababa, Ethiopia.
- ICEM (2003). *Lessons Learned From Global Experience*. Review of Protected Areas and Development in the Lower Mekong River Region, Indooroopilly, Queensland, Australia.

- IUCN (1996). IUCN Red List categories, IUCN, Gland.
- Jacobs MJ, Schloeder CA (2001). Impacts of Conflict on Biodiversity and Protected Areas in Ethiopia. Washington, D.C.: Biodiversity Support Program.
- James Y (2012). Ethiopian Protected Areas: A snapshot as reference guide for future strategic planning and project funding. pp. 1-46.
- Jones AM (2005). A proposed management plan for Ethiopia's Nech Sar National Park: Executive summary. URL: <http://www.alisonjonesphoto.com/NGOs/NSNP.pdf>. Accessed on 25.02.2015.
- Knapp D (2000). The Thessaloniki Declaration: a wake-up call for environmental education? *J. Envir. Educ.* 31:32-39. <http://dx.doi.org/10.1080/00958960009598643>
- Kolahi M, Sakai T, Moriya K, Aminpour M (2013). Ecotourism Potentials for Financing Parks and Protected Areas: A Perspective from Iran's Parks. *J. Modern Accounting and Auditing.* 9:144-152.
- Kolahi M, Sakai T, Moriya K, Makhdoum MF, Koyama L (2013). Assessment of the Effectiveness of Protected Areas Management in Iran: Case Study in Khojir National Park. *Environmental management.* 52:514-530. <http://dx.doi.org/10.1007/s00267-013-0061-5>
- Kolahi M, Sakai T, Moriya K, Makhdoum MF (2012). Challenges to the future development of Iran's protected areas system. *Environ Manag.* 50:750-765. <http://dx.doi.org/10.1007/s00267-012-9895-5>
- Kolahi M, Sakai T, Moriya K, Yoshikawa M, Esmaili, R (2014). From Paper Parks to Real Conservations: Case Study of Social Capital in Iran's Biodiversity Conservation. *Intl. J. Environ. Res.* 8:101-114.
- Kolahi M, Sakai T, Moriya K, Yoshikawa M, and Trifkovic S (2014). Visitors' Characteristics and Attitudes towards Iran's National Parks and participatory conservation. *PARKS J. IUCN.* 20:49-62. <http://dx.doi.org/10.2305/IUCN.CH.2014.PARKS-20-1.MK.en>
- Leverington F, Costa KL, Pavese H, Lisle A, Hockings M (2010). A Global Analysis of Protected Area Management Effectiveness. *Environ Manage.* 46:685-698. <http://dx.doi.org/10.1007/s00267-010-9564-5>
- Locke H, Dearden P (2005). Rethinking protected area categories and the new paradigm. *Enviro. Conserv.* 32(1):1-10. <http://dx.doi.org/10.1017/S0376892905001852>
- Lowman M (2004). Ecotourism and its impact on Forest Conservation. American Institute of Biological Sciences. URL: www.ncf.edu/PublicAffairs/documents/Lowman.htm.
- Luoga EJ, Witkowski ETF, Balkwill K (2000). Subsistence use of tree products and shifting cultivation within a miombo woodland of eastern Tanzania, with some notes on commercial uses. *S. Afr. J. Bot.* 66:72-85.
- MEA (Millennium Ecosystem Assessment) (2005). Ecosystems and Human Well-Being: Policy Responses. 3:8. Island Press, Washington, DC.
- Meduna AJ, Ogunjinmi AA, Onadeko SA (2009). Biodiversity conservation problems and their implications on ecotourism in Kainji Lake National Park, Nigeria. *J. Sustain. Develop. Afr.* 10: 59-73.
- Melaku T (2011). Wildlife in Ethiopia: Endemic Large Mammals. *World J. Zool.* 6:108-116.
- Miller JR, Wiens JA, Hobbs NT, Theobald DM (2003). Effects of human settlement on bird communities in lowland riparian areas of colorado (USA). *Ecol. Appl.* 13:1041-1059. [http://dx.doi.org/10.1890/1051-0761\(2003\)13\[1041:EOHSOB\]2.0.CO;2](http://dx.doi.org/10.1890/1051-0761(2003)13[1041:EOHSOB]2.0.CO;2)
- Million B (2011). Forest plantations and woodlots in Ethiopia. A platform for stakeholders in African forestry: African forest forum working series. 1: 12. Monela GC, O'Kting'ati A, Kiwele PM (1993). Socio-economic aspects of charcoal consumption and environmental consequences along the Dar-es-Salaam-Morogoro highway, Tanzania. *For. Ecol. Manag.* 58:249-258.
- Mulat D, Fantu G, Tadelle F (2004). Agricultural development in Ethiopia: Are there alternative to food aid? Addis Ababa, Ethiopia, pp.12-62.
- Nagendra H (2008). Do parks work? Impact of protected areas on land cover clearing. *Ambio.* 37:330-337. <http://dx.doi.org/10.1579/06-R-184.1>
- NSNP (2012). Nechisar National park annual report.
- Onadeko SA (2004). Home on the range: crises, consequences and consolations. Unaab Inaugural Lecture Series no.17. University of Agriculture, Abeokuta, Nigeria. Pp 86.
- Phillips A (2003). Turning ideas on their head: the new paradigm for protected areas. *The George Wright Forum.* 20(2):1-25.
- Population Action International (1999). One in Three People Lives in Forest-scarce Countries. Population Action International, Washington, DC.
- Roe D, Ashley C, Page S, Meyer D (2004). Tourism and the Poor: Analysing and Interpreting Tourism Statistics from a Poverty Perspective Pro-Poor Tourism Working paper No. 16, Overseas Development Institute, London, UK.
- Sintayehu W, Afework B, Mundantra B (2011). Species diversity and abundance of small mammals in Nechisar National Park, Ethiopia. *Afr. J. Ecol.* 50:102-108.
- Solomon B, Akililu A, Eyualem A (2012). Awash National Park, Ethiopia: use policy, ethnic conflict and sustainable resources conservation in the context of decentralization. Blackwell Publishing Ltd, *Afr. J. Ecol.* 51:122-129.
- Steve S (2011). Multiple-Household Fuel Use: a balanced choice between firewood, charcoal and LPG: Poverty-oriented Basic Energy Services (HERA). Federal Ministry for Economic Cooperation and Development (BMZ). GIZ GmbH. Weg 1-5 65760, Eschborn, Germany.
- UNEP/CBD/SBSTAA (2010). Experiences in the Development of National Biodiversity Indicators. Subsidiary Body on Scientific, Technical and Technological Advice. UNEP/CBD (UNEP/CBD/SBSTAA/14/INF/12. Nairobi, Kenya. 6pp. UNWTO (2013). UNWTO Tourism Highlights 2013 Edition.
- Vaisman A (2001). Trawling in the mist. Industrial fisheries in the Russian part of the Bering Sea. Cambridge: TRAFFIC Network Report. 79 p.
- Watkinson AR, Ormerod SJ (2001). Grasslands, grazing and biodiversity: editors' introduction. *J. App. Ecol.* 38:233-237. <http://dx.doi.org/10.1046/j.1365-2664.2001.00621.x>
- WHO (2006). Fuel for life: household energy and health. WHO Library Cataloguing-in-Publication Data.
- World Bank (2006). Ethiopia: Towards a Strategy for Pro-Poor Tourism Development, Report No. 38420 –ET.
- World Bank (2011). Africa Development Indicators. Washington DC: The World Bank.
- Yisehak D, Afework B, Balakrishnan M (2007). Human impact on population status of plains zebra (*Equus quagga*) in Nechisar Plains, Nechisar National Park, Ethiopia. *Int. J. Ecol. Environ. Sci.* 32:137-141.