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Review Article

POTENTIAL AND THREATS ON NATIONAL PARKS: THE CASE OF NECH SAR NATIONAL PARK

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Abstract: This review was made in Nech Sar national park which is one of the protected areas of Rift valley in Ethiopia. The objective of this review was to assess the potential and threats on Nech Sar national park to be an indicator for the better management of protected area in the country Ethiopia. The methodology followed was mainly reviewing articles from known journals, reports and thesis pertinent to the topic. The available materials were systematically selected on the basis of content, relevance and their publication time and concrete evidence were presented about the current status of the park. Nech Sar national park is among IUCN category II National Park in Ethiopia and established in 1974 to conserve the endemic Swayne's hartebeest and other key species as well as preserving its scenic beauty. The park's landscape includes extensive grasslands, savannah, mountains and hills and has a variety of habitats ranging from savannah, dry bush and ground water forests (EWNHS, 2001). However, this Park is not yet gazetted. The problems are more intensified and the wildlife population has gradually declined from time to time. Some of the major problems that contribute to the destruction of natural habitats, and hence wildlife in NNP were overgrazing by livestock, deforestation for agricultural expansion and harvesting fuel wood (charcoal and firewood) (NNP annual report,2010). Based on our intense review we conclude that to preserve the floral and faunal diversity and to conserve the scenic features and natural resources within the park win-win approach should be established to resolve the conflict of interest among the park administrator and the local community.

Keywords: Nech Sar National Park, Swayne's hartebeest , Gazetted, win-win approach

Introduction: The IUCN definition of protected areas stated that "A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley 2008:8). More than 161,991 areas have been recently accounted as PAs in the World Database of Protected Areas and the number persists to enlarge (Kolahi *et al*., 2013).

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Protected areas (PAs) play significant roles in protecting biodiversity and sustaining the essential service supplied by the natural systems. PAs have for quite some time been the best way to safeguard ecological areas from different types of land use (EEA, 2010). In most developing nations, PAs are under stress from anthropogenic activities and the absence of suitable executives (Kolahi *et al*.,2012).

Ethiopia is recognized for its faunal and floral diversity with predictable plant species of 6500-7000 of which 2% are regarded as endemic (Melaku Tefera, 2011). From the total land area of the country, PAs such as national parks, sanctuaries, controlled hunting, open hunting, wildlife reserves and community conservation areas contribute to about 15% (BIDNTF, 2010). The Ethiopian national parks, however, are characterized by holistic conservation approaches, little efficiency, and quarrel between local people reside in or adjacent to the parks and state authorities (Jacobs and Schloeder 2001; Bassi 2003; Teklu 2006; Stellmacher 2007b; Abiyot 2009; Stellmacher and Nolten 2010; Zewdie 2010; Asebe 2011; Asebe 2012).

Nech Sar national park is one of the protected area in Ethiopia that extended within Abaya and Chamo lakes. With its forty springs, it has exceptional and marvelous natural beauty, unique biodiversity and a wide range of tourism potential. However many of national parks are not gazetted in the country including Nech Sar national park and hence there is very limited law enforcement in protecting illegal poaching and forest resources harvesting from the protected areas. To save the protected areas and the valuable resources within it, appropriate conservation strategy must be put in place. This, however, requires proper inspection of the environmental resources and creating a sense of ownership to the local community. Therefore, the objective of this paper is to review the potential opportunities and treats found in the Nech Sar national park and recommend the sustainable way of management approaches to protect the natural resources located in park.

Methodology

Area description: Nech Sar national park is situated in the center of Ethiopian Rift valley at a distance of 510 km south of Addis Ababa. It is located at $5^0$51'-$6^0$05'N Latitude and $37^0$32'-$37^0$48'E Longitude within the Southern Nations, Nationalities and Peoples Region (SNNP) at an altitude range of 1,108-1,650 m asl (Bolton, 1970). The annual average rainfall of the area is 880mm with most of the rain falling between March to May, and a smaller amount between September to November. The annual mean temperature ranges from 12.2^{0}C to 34.3^{0}C. Nech Sar (meaning 'white grass' in Amharic) is situated on the floor of the Great Rift Valley in the Southern region of Ethiopia. The park was established in 1974 between the two lakes of Abaya and Chamo (Figure1) both of which are located in the craters of ancient volcanoes and presumably, the two lakes were connected as a single large lake covering the whole of existing park during the pluvial period (Bolton, 1970). Although it was long been designated in as a national park, the Park has not yet been formally gazetted.

The Park is bounded to the east by the Amaro Mountains, to the west town of Arba Minch and to the north and south by lakes Abaya and Chamo, respectively. In the far eastern part of the park, hot springs bubble to the surface, while numerous natural springs known as Arba Minch (meaning 'forty springs') occur in the western most extreme of the Park. The forty springs where the name 'Arba Minch' derived are found within the National Park at the center of the ground water forests and is the best place for tourist destination. There are, two main river systems that flow through the park forming riverine forests and woodlands. Sermele River crosses north-south at the eastern part of the park along the grassy plains and acacia woodlands and meets with Miyo River. The Kulfo River flows through the north of Arba Minch and then cuts across the neck of the narrow isthmus of land and ends in a swamp on

the shore of Lake Chamo (Mateos, 2003; Tamrat, 2001).

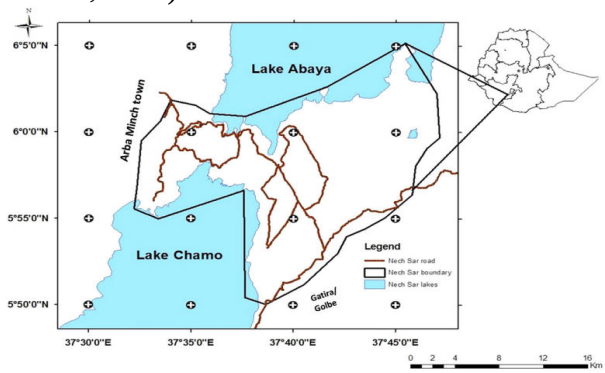

Fig.1. Location map of Nech Sar national park

Data Collection and Analysis: The methodology followed was mainly reviewing articles from known journals, reports and thesis pertinent to the topic. The available materials were systematically selected on the basis of content, relevance and their publication time and concrete evidence were presented about the current status of the park.

Faunal Diversity: Wildlife: The aquatic and terrestrial ecosystem of Nech-Sar National Park contains more than 90 mammal species (Duckworth, *et al*. 1992). Among these large mammals, Swayne's hartebeest (*Alcelaphus buselaphus swaynei*), Burchell's zebra (*Equus burchelli*), Grant's gazelle (*Nanger granti*), Waterbuck (*Kobus ellipsipprymus*), Warthog (*Phacochoerus africanus*), Bohor reedbuck (*Redunca redunca*), Oribi (*Ourebiaourebi*), Greater kudu (*Tragelaphus strepsiceros*), Common Bushbuck (*Tragelaphus scriptus*), Guenther's dik-dik (*Madoqua guentheri*), Grey Duicker (*Sylvicapra grimmia*), Bush duiker (*Sylvicapra oreotragus*), Bush pig (*Potamocherus larvatus*), and Hippopotamus (*Hippopotamus amphibious*). Lion (*Panthera leo*), Leopard (*Panthera paradus*), Serval cat (*Leptailurus serval*), Spotted hyena (*Crocuta crocuta*), Common jackal (*Canis aureus*) and Nile crocodile (*Crocodylus niloticus*) are the major predators recorded in the park. Four primate species, Anubis baboon (*Papioanubis*), Vervet monkeys (*Chlorocebus pygerythrus*) and Black and white colobus monkey (*Colobus guereza*), 19 bat species recorded in Nech-Sar National Park. The avifauna including kingfishers, storks, pelicans, flamingos and fish eagles as well as for its migratory birds, and few birds including Wattled ibis, and Nech-Sar Nightjar are endemic species found in the park (Vreugdenhil, D.*et al*., 2012).

Avifauna: It is the habitat of more than 350 species of birds and acts as the destination of many Palaearctic and intra-Africa migrants (Duckworth, *et al*. 1992). It is classified as one of the sixty-nine important Bird Areas in Ethiopia. Some of the bird community seen include Red-billed Hornbill, Grey hornbill, Fish eagle, Flamingos, Kori bustard, Kingfishers, Storks, Pelicans, and Abyssinian ground hornbill.

Reptiles and Amphibians: Lake Chamo is famous for being home to the largest Nile crocodiles in Africa. A considerable number of snakes, lizards, tortoises and frogs are found in the park. A total of 21 species of snakes including the African egg-eater occurs in the area (http://nechisarnationalpark.com/wildlife-and-attractions/).

Floral Diversity: Nech Sar national park is lying within the Somali Masai Regional Centre of Endemism, one of the major floristic regions in Africa. The park has approximately 800-1000 plant species (Tadesse Mesfin pers. comm. 1991 cited in Duckworth *et al*. 1992:7). As a result, Nechsar national park is known for its biodiversity and belongs to the East African Biodiversity Hotspot (CI 2007). The beautiful and diverse evergreen habitat found in Nech sar national park is dominated by large trees such as the Giant figs, *Ficus sycomorus* and *Ficus vasta, forest mahogany, Trichilia dregana,* and the *Sermule* Valley characterized by classic dry season habitat with large umbrella acacias (*Acacia tortilis) and sycamore figs (Ficus sycomorus).*The Arba Minch ground water forests, Kulfo and Sermele riverine forests are found within the vicinity of Nech Sar national park (Duckworth *et.al*., 1992). The ground water forests and the Sermele valley forests

are located in the western and eastern part of the park respectively, whereas, the Kulfo riverine forest is located in between the two forests but near to the ground water forests. Mateos, 2003 and Duckworth *et al*. (1992:1) characterize the ground water forest in Nech Sar NP as a diverse plant species composition and biologically rich rare habitat. It is unique in its vegetation formation from which the miracle forty springs emanated. It is served as a source of food, feed and bee fodder, and provide other environmental and social services to the community in Arba-Minch town and for villagers who live near the forest (Lemlem Aregu & Fasil Demeke, 2006).

Land Use and Land Cover: The park covers an area of about 514 km^2 composed of diverse habitats including the grasslands, acacia savannah, woodlands, rivers, riverine forests, ground-water forests and parts of lakes.A study on land use/land cover changes in Nech Sar national park between the years 1986 and 2000, shows that bushy shrub grassland had been declining at a rate of 470 ha/annum, the riparian forest cover at a rate of more than 3.34 ha/annum and the swamp vegetation at a rate of 92 ha/annum (Asaye 2008:58-60). In the same period, cultivated land in the park increased at a rate of 12 ha/annum.

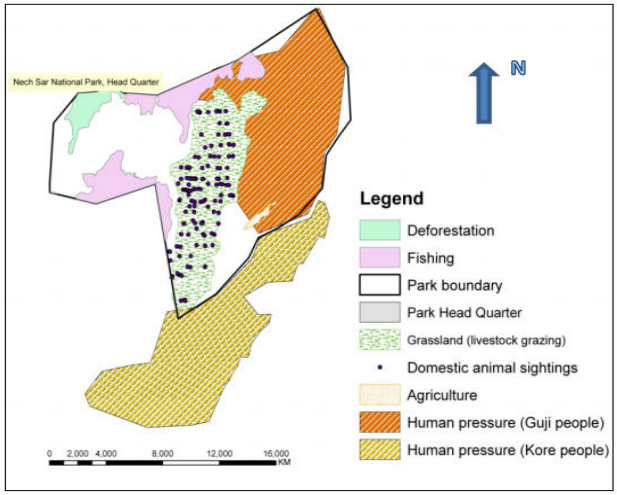

Fig. 2. Land use and anthropogenic pressure on Nech Sar NP. Source: Adopted from Girma Kelboro and Till Stellmacher Working Paper, 2012.

Unique Features of the Park: The presence of many large mammals and avifaunal diversity with two major lakes; Abaya and Chamo, Nech-Sar plain, Rift Valley escarpment, 40 hot springs, white creamy grass covers the central plains attracts both local and international tourists. A backdrop of hills and mountains between lakes Abaya and Chamo creates a unique landscape referred as "Bridge of God" or "Bridge of Heaven" combined with golden white grass make it one of the most attractive national parks in Ethiopia. Lake Chamo supports a high density of large crocodiles (more than 5m length of individuals) with a particular concentration at the beach known as the 'Crocodile Market' (Figure 3). Nowhere else in Africa can one observe huge crocodiles basking in the sun as closely as on the 'Crocodile Market' in Lake Chamo (http://nechisarnationalpark.com/wildlife-and-attractions/).

Fig. 3. Crocodile Market. Source: Adapted from Nech Sar national park website (http://nechisarnationalpark.com/wildlife-and-attractions/)

Threats: The park is, however, acknowledged as one of the protected areas in Ethiopia that suffer from a high anthropogenic resource extraction and loss of habitat. Overfishing in the lakes, wood gathering from the forests, cattle grazing in the grasslands, farming in the Sermelle River Valley and threats of invasive alien plant species are identified as the major problems facing the park (Freeman 2006 and all

quarterly reports of Nech Sar national park during 2005 to 2008).

The population of Swayne's hartebeest (Alcelaphus buselaphus swaynei) – the park's flag-ship species (Bolton, 1970) – declined extremely as it is described from the working paper prepared by Girma Kelboro and Till Stellmacher 2012 (Table 1).

Table 1: The population of Swayne's hartebeest in Nech Sar national park between 1967-2012.

Number of Swayne's Hartebeest	Year of census	Sources
130	1967	Bolton (1973:103)
100	1969/70	Bolton (1970:7)
100	1972	Bolton (1973:103)
61-77	2002/3	Befekadu (2005:14)
35	2007/8	Aramde *et al*. (2011:88)
12	2009/10	Demeke and Afework (2011:311)
13	End of 2010	Nech Sar National Park Records
6	2012	"

Source: Adopted from the working paper prepared by Girma Kelboro and Till Stellmacher 2012

The other illustrative case of plains zebra (Equus quagga) population size, which is among the most prominent mammals in Nech Sar national park, increased tremendously between 1970 and 1985 and decreased until 1995, while the latest trend again shows an increase until 2002 (Table 2).

Table 2: Changes in the population status of plains zebra in Nech Sar national park.

Number of plains zebra	Year of census	Sources
400	1970	Bolton (1973)
6500	1985	Kirubel (1985)
3000	1995	EWCO 1995
4500	2002	Yisehak *et al*. (2007)

Source: Adapted from Yisehak *et al*. 2007:83

The study conducted by Solomon Chanie and Dereje Tesfaye in 2015 shows that deforestation, through fuel wood collection and charcoal production, followed by grass cutting and illegal fire were the prominent threats to Nech Sar national park. This was mainly exercised by poor communities as a means of their livelihood via selling as obtained from 76% park expert respondents. Illegal poaching and settlement and domestic animal grazingwere additional challenging problem. Moreover, the Nech Sar protection staff revealed that illegal fishing was one of the most difficult activities threatening the lakes fish diversity.

Recent studies showed that the population size of Arba-Minch town has greatly increased from 2,830 in 1966 to 95,373 in 2012 (https://en.wikipedia.org/wiki/Arba_Minch). At present the rapid population growth of Arba-Minch is related to immigration of people from Gamo highlands, Wolaita and Gofa. This dramatic increase of population coupled with the higher demand of fuel wood and construction materials create huge pressure on the Arba Minch ground water forests and Kulfo riverine forests (Duckworth, *et.al*, 1993; Lemlem Aregu & Fasil Demeke, 2006).

Several studies have shown that there is strong relationship between vegetation and the hydrological cycle Vegetation has direct impact on rate of erosion, water quality, nutrients, water production and watershed property (Kassa Tadele and Gerd, 2007). Vegetation removal leads a decrease in photosynthetic rates and evapotranspiration where the decrease in evapotranspiration has an impact on precipitation, thus impacting stream flow and hydrological response (Wright *et al*., 1990; Cornish, 1993). Deforestation in the ground water forests resulted in the temporal variability of stream flow during wet and dry season. In the earlier times, the forty springs were providing constant water supply to the lake Chamo unlike the present fluctuation of stream flow between the dry and wet season (Aramde F. *et.al*.2012).

Since the time of its designation as a national park in 1974, Nech Sar national park has experienced fundamental and repeated changes in its formal organizational status. As the Military Regime of the Derg took control in 1974, its revolutionary policy change also affected Nech Sar national park governance. Another turning point in the Nech Sar national park management was the transitional period after the regime change in 1991. That was the time when the park's natural resource degradation was accelerated. In the power vacuum during the transition period, Arba Minch town residents and people from Gamo Highlands began indiscriminate cutting of firewood and timber. The Guji returned with their cattle to the Nech Sar grassland plains and the Kore people continued their cultivation in the Sermelle River Valley.

Conflict of Interest in Nech Sar National Park: Since its establishment, there are two major ethnic groups exercising two distinct economic activities inside the park, the Kore and Guji who mostly engaged in Agriculture and animal husbandry, respectively (Tamrat, 2001). As the Military Regime of the Derg took control in 1974, its revolutionary policy change also affected Nech Sar national park governance. People living in the park were forcefully removed outside its boundaries in 1985/6. As a result, Nech Sar national park remained free from human settlement until 1991. In the power vacuum during the transitional period after the Derg regime changed in 1991 the park's natural resource degradation was accelerated. The Kore people, Arba Minch town residents and people from the highlands surrounding Arba Minch and Guji returned back to Nech Sar national park. Arba Minch town residents and people from Gamo Highlands began indiscriminate cutting of firewood and timber. The Guji returned with their cattle to the Nech Sar grassland plains and the Kore people continued their cultivation in the Sermelle River Valley. The Guji also continued crop cultivation which was began in the valley before they were forcefully driven out of the park. The resource exploitation was at its peak in May and June 1991. However, the federal government handed over the park management to the newly established SNNPRS in 1995 and little progress was made in terms of resource sustainability in the park. Another milestone in the park's history was when the responsibility of Nech Sar NP was handed over to the non-governmental international conservation organization, African Parks Network (APN) on February 01, 2005 for 25 years based on an agreement signed between the Federal Ministry of Agriculture, the SNNPRS President's Office and APN on February 17, 2004. According to the agreement SNNPRS resettled Kore. But, APN was unsatisfied by the failure to resettle Guji then after three years it disrupted the agreement in 2008, stopped all its activities in Nech Sar national park and withdrew from Ethiopia. The difficulty to negotiate the differences in interest between Oromia Region and SNNPR contributed to the complication of the park's management by APN. After APN's withdrawal, in 2008, the responsibility for the park administration was taken-over by the SNNPRS Bureau of Culture and Tourism. In 2009, it was again handed over to the Federal Ethiopian Wildlife Conservation Authority (EWCA).

The other responsible factor for the degradation of the Nech Sar national park is overfishing and illegal cutting of the riverine lowland forests by the town dwellers from Arba Minch while the Guji people are blamed for overgrazing and trampling and disease transfer between the domestic and wild animals in Nech Sar NP (Freeman 2006). In addition, Guji claim that exclusive approach of the conservationists is responsible for the degradation of natural resources in Nech Sar national park. Guji used to burning grass before the rain and bush fires to promote grass regeneration. This practice, which can kill trees and bushes at the early stages of their growth or before germination, is prohibited in Nech Sar administrator. Many Guji hence perceive the prohibition of seasonal fire in the

grassland plains as a cause for expansion of invasive species such as *Abutilon spp*. Concentration of cattle and people to a relatively small area on the contrary to their tradition of transhumance is the other reason Guji give to justify degradation of the grassland plains. Population control, ethnic regionalism and the enforcement of park regulations forced them use smaller areas more intensively. Nowadays, they drive their cattle only between Sermelle River Valley and the Nech Sar grassland plains, a much smaller area than before.

Conclusion and Recommendation: Even though, national parks, wildlife sanctuaries and reserves are established today to conserve biodiversity and enhance eco-tourism, as well as supporting the livelihood of both the national and local users, the value given to protected areas development is very low as compared to countries which are involved with similar activities such as Kenya, Tanzania and South Africa. Most of protected areas of the country are under serious threat from the surrounding communities which arises from human encroachment. Many of National Parks are not gazetted including Nech Sar national park and hence there is very limited law enforcement in protecting illegal poaching and forest resources harvesting from the protected areas. If the current scenario continues, the local community would lose any benefit that it might obtain from the park resources and the associated wild life would be in a great risk.

The shift in development thinking and practices in the 1970s called for local peoples' participation in decision-making processes (Chambers 1983). Within the framework of the concept of sustainable development which had its breakthrough in the Rio summit in 1992, local people were believed not only to have the right to participate but also to have valuable knowledge and practices that can contribute to a sustainable use and management of protected areas (Beltrán 2000:3). Consequently, the current principles of IUCN appreciate the need for participation of local people in the resource use, conservation and management and benefit sharing from national parks (Dudley 2008:6; Dudley and Stolton 2008:51). local people were believed not only to have the right to participate but also to have valuable knowledge and practices that can contribute to a sustainable use and management of protected areas (Beltrán 2000:3). One means to increase direct benefits for local people from national parks is management zoning. Zoning enables dividing protected areas into core protection areas, used for exclusionary conservation, buffer zones which can be used by local people thereby reducing pressure on core areas and transition or development areas in which local people can exercise their full management responsibility (Diego 2001:3-5; Nelson and Makko 2005). The other extreme of local benefit sharing involves the situation in which local people organize themselves and bear the full responsibility for protected area management. One example is the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe (Tenkir 1999).

Since human-centered conservation is becoming a standard approach in many countries (Philips, 2003) as a tool for social planning and income generation (Locke and Dearden, 2005), it is good to make conservation efforts in national parks more systematic and efficient through active management, legal, political and financial support from top level 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 instrumentation.

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