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Shifting paradigms for Nepal's protected areas: history, challenges and relationships

Babu R BHATTARAI[1, 2*] http://orcid.org/ 0000-0003-2879-8803; e-mail: bhattarai.babur@gmail.com
Wendy WRIGHT[2] http://orcid.org/0000-0003-3388-1273; e-mail: wendy.wright@federation.edu.au
Buddi S POUDEL[3] http://orcid.org/0000-0002-3987-8684; e-mail: bppoudel@dfrs.gov.np
Achyut ARYAL[2,4] http://orcid.org/0000-0001-6658-8714; e-mail: savefauna@gmail.com
Bhupendra P YADAV[1] http://orcid.org/0000-0002-6704-1267; e-mail: bhupendra.dnpwc@gmail.com
Radha WAGLE[5] http://orcid.org/0000-0002-7481-7019; e-mail: radhawagle2000@yahoo.com

** Corresponding author*

[1] *Department of National Parks and Wildlife Conservation, #860, Kathmandu, Nepal*
[2] *Faculty of Science and Technology, Federation University Australia, Victoria, Australia*
[3] *Department of Forest Research and Survey, # 3339, Kthmandu, Nepal*
[4] *Institute of Mathematical and Natural Sciences, Massey University, # 102904, Auckland, New Zealand*
[5] *Ministry of Forests and Soil Conservation, # 12476 Kathmandu, Nepal*

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Abstract: The modern history of protected area (PA) management in Nepal dates back to 1973 when the National Parks and Wildlife Conservation Act (1973) was promulgated and Chitwan National Park was established. In the years immediately following these key events, protected area acts and regulations were strictly applied and the role of local people in managing natural resources was neglected. However with the passage of time, and with changes in the socio-political and economic characteristics of Nepal, management regimes have shifted towards a more liberal model which recognizes more clearly the contributions of people living and working within protected areas. Recently, landscape level conservation models including the designation of multiple use areas have been utilized in the development of management plans for protected areas in Nepal. Conservation agencies have attempted to tackle challenges such as land use conflict, poaching and smuggling of wildlife parts and illegal harvesting of highly valued medicinal herbs through regulation, but these efforts are not always successful. We recommend a holistic conflict resolution approach which recognizes and resolves the different needs of all stakeholders.

Keywords: Protected area; National Park; Conservation; Management; Development history; Nepal

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Introduction

After enforcement of the Convention on Biological Diversity (CBD) in 1993 (CBD 2015) and following the United Nations' Framework Convention on Climate Change (UNFCCC) in 1994, the appropriate governance and management of protected areas (PAs) has been globally recognized as an important political and ecological theme (UNFCCC 2015). The CBD called for the creation of

more PAs to support the in-situ conservation of biodiversity (Naughton-Treves et al. 2005). In addition, the contribution of PAs in mitigating against climate change via stored carbon was recognized within the UNFCCC via the Reducing Emission from Deforestation and Forest Degradation (REDD) provision (Brandon & Wells 2009; Ferraro et al. 2011; Miles & Kapos 2008). This highlighted the significance of PAs among the world's politicians. Further, the Millennium Development Goals established following the Millennium Summit of the United Nations in 2000, broadened the recognized role of protected areas to include contributions in the areas of poverty reduction and national development (Naughton-Treves et al. 2005; Peturssion & Vedeld 2015).

In Nepal, the importance of PAs was recognized in the early 1970s. Nepal's first National Park, Chitwan, was declared in 1973, one hundred years after the establishment of Yellowstone National Park, the world's first protected area (Mishra 1982). Today, there are ten National Parks, three Wildlife Reserves, one Hunting Reserve and six Conservation Areas throughout the country. These cover 23.23% of the total land of Nepal (DNPWC 2011 see Figure 1 and Appendix 1) and are variously located across Nepal's high mountains, midhill areas and lowland areas. These different types of PAs are managed and governed under different regimes supported by appropriate legislation. However, with the increasing populations of humans and livestock throughout the country, PAs in Nepal are facing increasing challenges.

In current discourses about conservation in Nepal, there is considerable debate about the role and establishment of protected areas in the lowlands, where the most fertile agricultural land is found. Most of Nepal's land area is not suitable for agriculture due to high altitudes and steep mountain slopes (Ghimire 1998; Thapa & Niraula 2008). As in other developing countries, food security concerns are competing with concerns about the protection of ecosystems and the conservation of biodiversity. PA management and governance is thus significantly affected by national and international forces and affairs, particularly in developing countries where the roles of PA in biodiversity conservation and economic development can sometimes clash (Kollmair et al. 2003; Seeland 2000). For example, Chitwan National Park was encouraged not to construct a concrete road thorough the core of the park (S. Bajimaya, personal communication, May 16, 2015) by the United Nations Educational, Scientific and Cultural Organization (UNESCO), which has responsibility for reporting and monitoring possible changes in the state of conservation of World Heritage listed sites (UNESCO 2016).

This review draws on the authors' substantial experience in PA management and on the available published and unpublished literature to describe the development of PA management in Nepal. We aim to document the challenges of, and changes in, protected area management and governance in a developing country over time. The particular challenges associated with balancing efforts to conserve and manage biological diversity while facilitating social and economic development of human communities are highlighted.

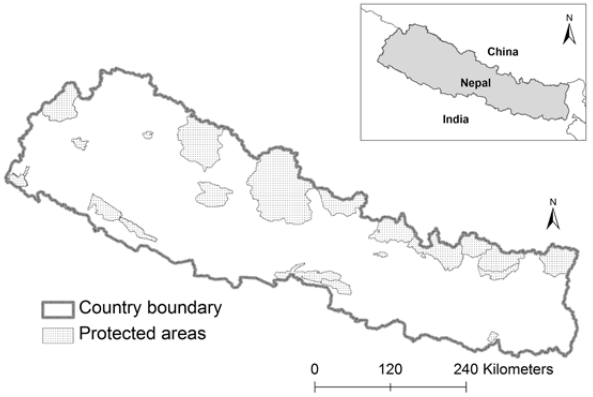

Figure 1 Protected areas in Nepal.

1 History of Protected Areas in Nepal

Prior to the 1950s, Nepal was governed by the Rana dynasty, which reduced the Shah monarch to a figurehead and made the prime minister and other government positions hereditary. There were no comprehensive legal provisions to protect forests and natural resources were generally exploited. During this time, the lowland forests of Nepal were largely intact, mainly because malaria was endemic to the area and so there were few human settlements except the indigenous *Tharu* community. The *Tharu* were thought to have developed malaria resistance due to their long history of settlements in the marshy lands of the

terai (Terrenato et al. 1988 in Ranjan 2010). The Rana regime was overthrown in 1950 and during the following decade, the newly established democratic government addressed a food crisis in the mid-mountains via a major settlement program in the Chitwan valley, alongside an extensive malaria eradication effort (Guneratne 2002; Gurung 1983). This resulted in increased migration of people from the hill communities to the lowland areas. The amount of forested land was rapidly reduced (Chaudhary 2000).

At this time, the autocratic *Panchayat* ruled Nepal and the King was head of both the state and the government. The lowland areas of the Chitwan valley had been used by the country's elite, especially the Royal family and their international guests, for recreational hunting of deer, rhinoceros and tigers (Mishra 1982; Paudel et al. 2007). The government feared the loss of the pristine hunting grounds in the Chitwan valley, particularly with respect to the need to protect habitat for rhinoceros. A sanctuary for the protection of rhinoceros and their habitat was declared in the early 1960s (Bhatt 2003; Mishra 1982).

1.1 Protected areas in Nepal in the 1970s: pristine nature

By 1973, Nepal had entered into a modern era of protected area management, as evidenced by the promulgation of the National Parks and Wildlife Conservation (NPWC) Act 1973 and the establishment of Chitwan National Park (CNP). This was a landmark step in the history of conservation in Nepal and was followed by the gazetting of other parks and reserves in the mid 1970s to protect the diverse ecosystems, landscapes and the representative flora and fauna of the country (Upreti 2001).

The National Parks and Wildlife Conservation Act of 1973 (NPWCA) was very strict, restrictive and followed the Yellowstone model, which emphasized the protection of a pristine area and prevented people living inside the park (Heinen 1996; McNeely 1994). During the 1970s, the government forcefully relocated villages from core areas of parks and reserves to areas outside the boundaries (Upreti 2001). For example, 650 people from two villages were relocated from Rara National Park (a highland area) to the lowlands of the Banke district. This process probably resulted in the deaths of some people due to environmental and socio cultural stress, including differences in climate and culture (Heinen & Kattel 1992). Likewise, 1572 families were relocated from the Babai Valley of Bardia NationalPark during 1979-1984 (Brown 1997).

This period was dominated by 'command and control' approaches to park management. The Royal Nepalese Army, (later renamed the Nepalese Army under Ministry of Defense) was deployed for activities relating to park security and the enforcement of rules and regulations; and administration was carried out by park/reserve wardens, park rangers and game scouts, who worked under the auspices of the Ministry of Forests and Soil Conservation. The management of protected areas at this time was broadly guided by the 'Fine and Fence approach' (Baral 2005). Offenders who breached the NPWC Act 1973 by killing or injuring wildlife, or by being involved in the trade (buying, selling or transport) of protected wildlife including Tiger, Rhinoceros, Elephant, Snow leopard, Clouded leopard, Musk deer or Bison could be imprisoned for up to 15 years. Traditional use of resources from within protected areas (such as grazing of domestic stock; collection of fuel wood, construction timber, thatch grass and herbs for food and local medicine; and hunting and fishing) was banned. These bans were especially severe in lowland areas where entry into protected areas without prior permission of the park authority was considered illegal. In such places, local people were significantly disadvantaged by the lack of access to natural resources, and their quality of life was reduced along with access to their traditional livelihoods. However, people living inside PAs in the highlands experienced a different situation. Local resident within highland parks such as Langtang and Sagarmatha National Park were not relocated and they were granted limited use of park resources according to the Himalayan National Park Regulations, 1976. For example, local people were granted the rights to use park resources for purposes such as grazing livestock within designated areas, collecting grass, fodder, fuel wood and construction timber at low cost. The different management approaches in lowland and highland PAs in Nepal was linked to the scarcity of alternative resources for local people from the

highland areas. In addition, Highland PAs were formed primarily to ensure the sustainability of fragile agricultural land and to promote tourism (Kollmair et al. 2003) rather than the stronger focus on wildlife conservation in the lowland parks. There were no deliberate management interventions in PAs at this time, and it was considered sufficient to exclude disturbance from protected areas in order to preserve biodiversity.

The principle "nature balances itself" was strictly followed in most PAs, little disturbance occurred within parks, except for the examples mentioned above, occasional recreational hunting expeditions (by members and guests of the Royal Family) and natural fires that occurred during the dry season. However, conflict between park managers and local people was common during this period and the relationship between the two groups could be described as hostile (Paudel et al. 2007; Sharma 1990). Much of the conflict was around the lack of, or limitations to, access to resources that had traditionally been used by local people (Nepal & Weber 1995; Thapa & Chapman 2010; Thapa & Hubacek 2011).

1.2 Protected areas in Nepal in the 1980s: conservation and development

During the 1980s, the Nepalese government declared several more protected areas including Khaptad National Park and Shey-Phoksundo National Park (Appendix 2). However, as for PAs declared after the mid-1970s in the Himalayan region, such as Langtang and Sagarmatha National Parks, it was realized that relocation of people from within PAs was not possible, and arguably not desirable. Instead, local people were recognized as integral to PA management. With the establishment of National Parks in the high mountains of the Himalayan region, the management approach for Nepalese PAs moved from the Yellowstone model (where people were excluded from National Parks) to a new, so-called Eastern model, where local people were seen as conservation stewards and as essential elements of conservation (Heinen & Kattel 1992). Amendment of the NPWC Act 1973 in 1979 granted local communities the rights to collect thatch grass and reeds from the reserves once a year, which was a pioneer step towards a people-centered approach. It seems likely that the influence of the community forestry management approach, which was endorsed by the Master Plan for the Forestry Sector in 1988, played a role in this change to access rights for local people.

Further, following the Bali Action Plan, which was prepared during the World Congress on National Parks (1982) the Nepalese conservation authority (Department of National Parks and Wildlife Conservation - DNPWC) endorsed the concept of striving for the dual purposes of conservation and development. A pilot project was designed in 1986 for the Annapurna Conservation Area. This concept liberalized the rights of local people; and involved them in integrated conservation and development planning for the protected area and for their own community (Nepal & Webber 1993). The Government handed over the authority for management of the PA to a non-government organization (NGO) called the King Mahendra Trust for Nature Conservation (later renamed as the National Trust for Nature Conservation). This experiment added a new dimension in protected area management in Nepal; local people became an integral part of the PA (Jones 2007; Wells & McShane 2004) and felt a strong sense of ownership and responsibility for the protected area and the management approach. This project has been widely recognized worldwide and became an exemplary pro-people conservation model. In Nepal, the Integrated Conservation and Development approach was legally endorsed via ratification of the Conservation Area Regulation in 1989 (Jones 2007).

1.3 Protected areas in Nepal in the 1990s: participatory conservation

Protected area management strategy is dynamic; it changes with time according to the politics of the country and socio-economics of the society (Sharma 1990). While the strict protection policy of the government during the early periods of protected area management in Nepal succeeded to re-establish at least some depleted populations of iconic species such as tiger and rhinoceros, this achievement was at the cost of local human communities who lost access to resources needed for their subsistence (Sharma 2011). Increased populations of wildlife and the close proximity of

human communities to these populations led to increases in human-wildlife conflicts. During the 1990s, the rate of human casualties, livestock depredation and crop raiding caused by wildlife increased abruptly (see Gurung et al. 2008 and Seeland 2000 for details). Conflict between park managers and local people also occurred since these two groups of people saw the conservation of wildlife from vastly different perspectives, and experienced vastly different outcomes. In the wake of the success of the integrated conservation and development project in the Annapurna Conservation Area, the importance of addressing these conflicts was considered to be significant. Local people began to be considered as guardians and stewards of, rather than users of, Nepal's PAs.

The Government established links with partners such as the United Nations Development Program and the World Wildlife Fund; and Park and People Projects were launched in lowland protected areas where the conflict between park managers and local people was particularly severe. These projects initiated various outreach activities in communities located in the vicinity of parks and reserves, which helped to bridge some of the gaps between local people and park officials (Bajimaya 2003; Spiteri & Nepal 2008). The attitudes of local community members towards parks and reserves, and towards PA managers gradually changed over time. The political change in Nepal which occurred in 1990 (the partyless monarchy known as the *Panchayat* system was overthrown and a multiparty democratic system was established) provided an extra catalyst and many conservation policies, rules and regulations were revised to be more pro-people and more oriented toward democracy. Within this changing political and administrative environment, the NPWCA (1973) was revised in 1993 (4th amendment). The revision included a mechanism to allow the declaration of a buffer zone (often called an impact zone) around established parks and reserves. The size of each buffer zone is partially dependent on the requirements of local people for access to natural resources, and partly determined by natural landscape features and boundaries (HMGN 1996). The buffer zones include human settlements, agricultural lands and forested lands as well as rivers and lakes. The 4th amendment also ensured that revenue earned by parks and reserves would be delivered back to communities located in the buffer zones, to fund community development activities. Subsequently, the Buffer Zone Management Regulation 1996 granted rights to local people to manage and use the forest resources within the buffer zone. According to this regulation, local people themselves plan development activities through a buffer zone management committee, which is an elected body from the members of households located within each buffer zone. Modeled on the community forestry approaches of Nepal, which originated in early 1980s and which have been extremely successful – and recognized as such worldwide (Jones 2007), this strategy has helped to reduce the pressure of locals on core areas of parks and reserves and allowed better relations between local people and the park managers (Spiteri & Nepal 2008).

A total of 677 parcels of forests (0.20 million ha) are managed in this way and 0.63 million people are involved in buffer zone community forest management (NPC 2013). The inclusion of local communities in conservation management of PAs has led to the restoration of the surrounding forests and the creation of extended habitat (Gurung et al. 2008). Conservation scholars (e.g. Baral 2005; Jones 2007; Paudel et al. 2007) agree that the 4th amendment of NPWC act 1973 brought a revolutionary change in protected management within Nepal. As a result of this provision, 12 protected areas within Nepal have buffer zones (DNPWC 2011).

1.4 Protected areas in Nepal in the 2000s: a whole-of-landscape approach to conservation

A shift from site-based conservation to a landscape-scale approach to conservation in Nepal began in the 2000s with the initiation of the Terai Arc Landscape (TAL) project. The Terai is a lowland area in the southernmost part of Nepal. It is considered to have the highest biodiversity in the country. The TAL program was initiated in 2001 by the Government of Nepal with the collaboration of World Wildlife Fund (WWF), Nepal Program and two departments of the Nepalese Ministry of Forests and Soil Conservation (MoFSC): the Department of Forests (DoF) and DNPWC (WWF 2015). This approach emphasized the roles of

corridors and connectivity in biodiversity conservation.

Buffer zones continued to be established in and around Nepal's national parks and wildlife reserves into the 2000s. Approximately 5600 km² were added to the protected area system as buffer zones and a further 4000 km² was added as newly declared conservation areas (DNPWC 2011). Although the initial motivation for the establishment of buffer zones was to reduce pressure from human communities on core areas within protected areas, it was recognized that they could also act to improve connectivity at a landscape scale. The landscape-approach to conservation planning and management aimed to benefit both nature and people (HMGN 2004) and revenue earned by PAs was shared between conservation areas and local communities.

During this period, transboundary protected areas began to emerge. A transboundary protected area is one which spans the boundaries of more than one country or political entity (GTBN 2015). The Sacred Himalayan Landscape (SHL) is an example of a transboundary conservation area covering protected and adjoining areas in Nepal, India and Bhutan. Transboundary protected areas are another result of a landscape approach to conservation.

In 2006, the Nepalese Government moved a step further towards community management of protected areas. This is best illustrated by the hand-over of management responsibility of the Kanchenjunga Conservation Area to the local community (Aryal et al. 2010). This is perhaps the first PA in Nepal to be fully managed by local communities. The emphasis has changed dramatically from one focused on the protection of particular species to a to people-centered landscape conservation approach (see Appendix 3).

1.5 Protected areas in Nepal in the 2010s: additions to the PA network

Seven protected forest areas (covering 1572 km²) with significant biological, cultural and religious values were declared in 2010. These protected forests were selected so as to contribute to the landscape approach of conservation in Nepal, but as production forests, they are outside of the protected area system. These areas may be utilized by local people for resources such as timber and fodder. Three of the seven protected forests connect protected areas in Nepal and India and serve as ecological corridors for iconic species such as tiger, elephant and rhinoceros. Out of other four protected forests one has historical and cultural significance and rest three serve as link to national parks or conservation areas (Shrestha et al. 2014). The protected forests are governed by the Forest Act 1993 and the Forest Regulation 1995 and their management is the responsibility of the Department of Forests. The management model of these protected forests encourages and acknowledges the participation of local communities and they are similar to the conservation areas managed under NPWCA 1973 and Conservation Regulation 1996.

2 The Challenges of Protected Area Management in Nepal

Problems and challenges weaken the effectiveness of protected area management and, as in other parts of the world (Wells & McShane 2004), protected area managers in Nepal have faced, and continue to address, many management challenges (Heinen & Kattel 1992; Sharma 1990). These can be grouped into broad categories: conflicts, overexploitation, management of disturbances, tourism and development and resourcing. (Appendix 3 shows the importance of these challenges across different decades).

2.1 Conflicts

Historically, one of the most prominent challenges for PA managers in Nepal is conflict with the local community**.** Indigenous people in Nepal depend substantially on natural resources for their livelihoods and for cultural and religious purposes (Aryal et al. 2017).

After the establishment of protected areas, entry into the parks and use of park resources was initially banned. This resulted in conflict between local people and PA managers. This is broadly described as land use conflict (Mishra 1982; Spiteri & Nepal 2008) or land encroachment (Heinen & Kattel 1992). The demarcation of the boundaries of many protected areas is not clear and people often

extend their activities beyond the park boundary. Moreover, thousands of people become landless each year due to natural disasters such as flood and fire; and they use land within the boundaries of PAs illegally in order to survive. During the period of political insurgency in Nepal (1995-2004), thousands of people resettled near the lowland PAs (i.e. Chitwan, Bardia and Banke National Parks and Shuklaphanta and Parsa Wildlife Reserves) seeking either cheap land or security and many of them encroached on PA land. This problem is most severe in Nepal's lowland protected areas (Aryal et al. 2017).

Human wildlife conflict (HWC) is a severe and challenging issue in Nepal (Aryal et al. 2014; Aryal et al. 2015a, b; Bhattarai & Fischer 2014). This situation arises when wild animals threaten or kill people or their domestic animals and crops (Bhattarai & Fischer 2014; Gurung et al. 2008). For instance, in the period of 1998 to 2015, across the country, tigers, elephants and rhinoceroses killed and injured 177 and 97 people respectively (DNPWC 2016). This may be an underestimate as such incidents are not always reported and data management by the government authority is not complete. Similarly, leopards, snow leopards and black and brown bears frequently come into conflict with people in the upper mountainous reserves, attacking humans or killing livestock. There are no documented records of large losses of crops each year by ungulates, primates and fossorial animals however local people complain of such incidents, questioning why such 'nuisance' animals should be protected (pers. obs.).The consequences of HWC threaten the main aim of biodiversity protection through revenge killing of animals by local people, or removal of animals in order to protect local people. For example, 25 tigers (an iconic and globally endangered species) were removed from Chitwan National Park (for details see Gurung et al. 2008) and the surrounding area during 1979-2006 and four were removed from Bardia National Park during 1989-2009 (Bhattarai 2009). Tigers are known to kill people within forested areas and sometimes intrude into human settlements (Bhattarai & Fischer 2014; Gurung et al. 2008). According to section 10(2) of the National Parks and Wildlife Conservation Act (1973), such problem animals, where they can be identified, may be destroyed or (if space is available), moved to a zoo (HMG 1973). Removal of such animals is problematic as many species have very low population sizes and such action further reduces numbers of individuals in the wild. Human casualties, livestock loss and crop raiding are prominent and challenging problems for PA managers in Nepal (Bhattarai & Fischer 2014; Gurung et al. 2008; Studsrød & Wegge 1995).

2.2 Overexploitation

Poaching of wildlife and smuggling of herbs and timber products are also considerable problems for PA managers in Nepal. The rapidly increasing demand for wildlife body parts and plants for traditional medicine in some neighboring countries provide a significant motivation for smugglers of wild specimens. Rhinoceros horns, tiger bones, pangolin scales, musk pods of musk deer, gall bladders and bile ducts of bears, and hides of various species including tiger and deer are all examples of animal body parts which are commonly reported as smuggled from the country (Dangol 2015). There is also considerable evidence, in many protected areas in Nepal, of illegal hunting of prey species for meat, either for direct (subsistence) consumption by local people or for trade in local markets (Bhattarai et al. 2016). Similarly, excessive illegal collection of plants and fungi for traditional medicines such as *Cordyceps* fungus (collected, for example, from Shey-Phoksundo National Park) leaves of the yew, *Taxus* (for example, from Langtang National Park and the Annapurna Conservation Area), many orchid species and lichen and mosses are extremely problematic issues in the Himalayan Parks.

Smuggling of high value timbers is also recognized as a problem in virtually all lowland protected areas (Heinen & Kattel 1992). Construction timbers are very expensive and the ban on felling trees in national forests has created shortages of timber. These pressures have triggered the smuggling of timber from protected areas.

Smuggling of beetles, butterflies, birds, various mammals and lizards, has also been discovered by authorities at Nepal's capital city Kathmandu (Dangol 2015).

In some PAs environmental degradation due to over exploitation of minerals/construction

materials has been documented. Excessive excavation of boulders, sand and rocks from the fragile Siwalik region of Parsa Wildlife Reserve and Banke National Park have threatened the ecological balance in these areas. The role of the Siwalik (upstream) region in water recharge for the plain (downstream) is important; so the environmental degradation of the region has been recognized as a major concern and the Parliamentary Committee of Natural Resources have suggested that excavation should cease in this area. This recommendation has not yet been fully implemented by the government.

2.3 Management of disturbances

Some ecological disturbance is necessary for the maintenance of ecological processes. This is especially significant in grassland areas where removal of trees may be necessary to maintain grasslands in order to provide resources for herbivore (deer) populations, and their predators. Protected area managers lack appropriate policy in order to guide them in evidence-based decisions regarding such management actions.

Excessive disturbances also cause management issues. Although grazing is permitted in some of the highland PAs, illegal grazing and overgrazing have negatively affected biodiversity in most protected areas in Nepal. A lack of foraging land for domestic stock and extreme degradation of surrounding commons outside the PAs are known to exacerbate this issue (Heinen & Kattel 1992), which is not limited to Nepal (see also Bagchi et al. 2012 for a study in India and Pech et al. (2007) and Wilson and Smith (2015) for work on the Tibetan Plateau). At Koshitappu Wildlife Reserve, thousands of domestic buffalo graze in the reserve, reducing fodder availability for other grazers. They also breed with the only remaining wild water buffalo (*Bubalus bubalis*) in Nepal (Heinen & Kandel 2006), threatening the genetic pool of the wild population. There is significant competition for resources between wild and domestic stocks in protected areas of Nepal (Dong et al. 2009). Predators sometimes take domestic rather than wild herbivores, again generating conflict between local people and PA managers (Bhattarai & Fischer 2014; Gurung et al. 2008).

During the dry season, fire is a major disturbance in some of Nepal's protected areas. The lowland PAs experience severe fires, sometimes twice in a season. The natural fire frequency is lower. Many of the fires are deliberately lit by local people either to produce new grass shoots for grazing their cattle (Bhattarai 1997) or to trap deer for hunting. Occasionally, planned fires intended as grassland management interventions escape, and fire spreads across wide areas. It is assumed that forest fires might be responsible for declining populations of many frugivorous birds (Sodhi et al. 2004). Fire is also blamed for the decline of the Bengal florican (*Houbaropsis bengalensis*) an endangered avian species in Nepal (Baral et al. 2003).

Invasive species management has recently been a hot topic for PA managers in Nepal. A key species of concern is *Mikania micrantha,* a vigorously growing perennial creeper and a member of the Asteraceae family. This plant, commonly known as bitter vine, climbing vine or American rope, has covered most of the open grassland habitat in Chitwan National Park and is also of concern in Parsa Wildlife Reserve and Koshitappu Wildlife Reserve (Rai et al. 2012). It has greatly reduced the primary productivity of the grassland and shrubland habitats and its control has been a major challenge for PA managers. Other notorious invasive species are *Lantana camara* (known commonly as lantana, or wild sage) and *Eichhornia crassipes* (water hyacinth). Lantana has degraded the productivity of drier habitats and water hyacinth has invaded many wetland ecosystems, threatening the wetland biodiversity, especially in the eutrophic and mesotrophic lakes in the lowland and midhill protected areas of Nepal.

2.4 Tourism and development

Issues of tourism pressure and garbage management are clearly apparent in some of Nepal's protected areas. The extremely large numbers of visitors per year to Chitwan National Park (180,000), Sagarmatha National Park (49,805), Annapurna Conservation Area (>100,000), Bardia National Park (11,962) and Langtang National Park (14,439) have created many problems (DNPWC 2012; Lama 2012). There is no limitation on daily visitor numbers in these

parks. Problems caused by large numbers of visitors include: excessive garbage, overexploitation of natural resources to service visitors' requirements and direct effects on wildlife. These problems are exacerbated by a lack of appropriate visitor management strategies. Several examples are provided below:

(1) Excessive garbage left by trekkers on Mount Everest (Sagarmatha National Park-UNESCO world heritage site). (2) The slow growing rhododendron forests of *Namche bazar,* also in Sagarmatha National Park and in the *Kyanzin* valley in Langtang National Park, have been degraded to fulfill the energy required by visitors for heating and cooking (Heinin & Kattel 1992). (3) In addition, the construction of lodges and restaurants to accommodate visitors has directly affected the ecological integrity of the park such as Langtang, Chitwan and Sagarmatha National Parks and Annapurna Conservation Area since resources such as timber, boulders and gravel are typically sourced from within the park. (4) Finally, it is believed that high levels of disturbance due to human visitors have altered the natural behavior of rhinoceros in Chitwan National Park. High visitor numbers are also blamed for the degradation of the unique *Tharu* culture in and around Bardia and Chitwan National Parks (Lipton & Bhattarai 2014).

Although government policy discourages land uses within PAs for purposes other than conservation, development pressure is another serious management issue for PA managers in Nepal. National priority projects such as hydro-electricity projects and national highways are exempt from the policy. Some examples include the Chilime hydro electricity project in Langtang National Park, which disturbed the movements of Assamese monkey (*Macaca assamensis*) (Bhattarai 2001); and the East–West Highway which has fragmented Bardia National Park, disturbing the dispersal and movement of wildlife including tiger. Similarly, the proposed railway project, which will pass through Chitwan National Park (a world heritage site), and Arun III hydro-electricity project in Makalu Barun National Park will cause habitat loss, degradation and fragmentation in these PAs. The DNPWC has unpublished data, which shows that 62 infrastructure developmental projects (Hydroelectricity dams high voltage extension lines and roads) have recently passed environmental impact assessments in various protected areas. There are likely to be serious implications for biodiversity conservation if these projects are implemented. In addition to causing habitat disturbance, the expansion of motorable road networks has a secondary effect in facilitating and accelerating the smuggling of park resources. Development and conservation agencies do not always see eye-to-eye and protected areas, their managers and the agencies which govern them are often cast as anti-development.

2.5 Resourcing

Lack of sustainable funding sources for PA management is a big issue in developing countries (Bruner et al. 2004). Nepal is no exception to this (Sharma 1990). The budget allocated for the fiscal year 2013/2014 is only ~US $ 332 per square km (DNPWC 2014). Budgetary constraints mean that managers face problems in funding activities such as: the rescue and management of orphaned animals, management of problem animals such as man-eating tigers, rogue tusker (elephants) or leopards intruding into human settlements. Due to limited budgets, PA offices and staff quarters lack basic facilities including sanitary bathroom and toilet facilities, heating and cooling and basic electricity. As many field offices and living quarters are at high altitudes (above 3000m) and affected by severe cold, staff face harsh climatic conditions. Further, they regularly encounter dangerous situations either in the form of dangerous wildlife or encounters with poachers and smugglers; and there is no scheme or insurance against injury or loss of life. The authors are aware of three game guards who were killed by poachers in Bardia and Chitwan National Parks in 1989 and 2014 respectively. Similarly, in Shukla-Phanta Wildlife Reserve and in Parsa Wildlife Reserve, some staff, including park rangers, were killed and injured during the period of political insurgency due to explosions caused by the rebels. These conditions can reduce staff morale and motivation and can negatively affect PA management.

Lack of human resources**:** While the amount of land designated as protected area has increased, human resources remained constant from the 1990s to 2015 (see Figure 2). Buffer zones surrounding 12 PAs and four new protected areas

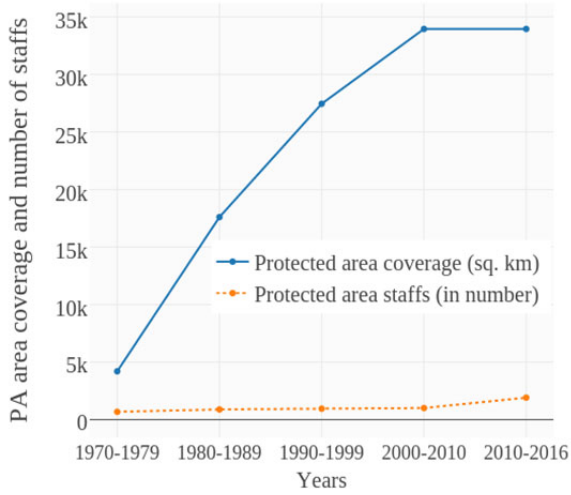

Figure 2 Comparison of the total amount of protected area in Nepal (km²) with the number of staff employed by the Department of National Parks and Wildlife Conservation from the 1970s to 2016.

have been added to the PA system in this time (Figure 1). Effective management is thus reduced. Administrative processes around recruiting additional staff are arduous and time consuming, adding further barriers to addressing this problem. In addition, the responsibilities of existing staff have been extended to include the implementation of various international obligations such as those required by the Convention on Biological Diversity, Convention on International Trade in Endangered Wild Fauna and Flora, Ramsar, World Heritage and UNFCCC. Further, following the declaration and implementation of buffer zones, park officials were required to establish harmonious relations with local communities through frequent communication, conservation education programs, various training opportunities and development activities within the buffer zones. Park staff, who are educated and trained in wildlife management and biodiversity conservation, are now required to participate in development projects such as small scale irrigation systems, rural road upgrades, construction of community housing and repair and maintenance of schools and other community infrastructure. In 2015 a new organizational structure for the Department of National Parks and Wildlife Conservation was approved and the number of staff has nearly doubled. The authors remain concerned that this increased number of staff remains insufficient to address the problems described here.

Many of the Acts and Regulations relevant to PA management in Nepal are outdated. The NPWCA, which was promulgated in 1973, is the prominent act governing protected areas. About half a dozen regulations exist under this act. Some of these regulations and the Act do not address current issues. For example, the fines for illegal hunting of rhinoceros or tiger were fixed in 1973 and are now too low (due to inflation and increased revenue earned from selling animal parts) to act as disincentives. Offenders easily pay any fines and investigations have shown that the same individuals are repeatedly involved in wildlife crimes (K. Kunwar, personal communication, January 10, 2014). The list of protected animals scheduled in Appendix 1 of the NPWC Act, 1973 also needs revision since the population status and level of threats to many species have changed significantly; and some species, which are not currently listed, have recently been found to have severely reduced population numbers. Some examples include Sambar deer *(Cervus unicolor)*, leopard *(Panthera pardus),* sloth bear *(Melursus ursinus)* and several species of vulture. Some newly discovered species, such as Pallas's cat (*Otocolobus manul*), previously not known from Nepal, are also not included in the listing.

3 Relationships among Nepal's Conservation Agencies

The DNPWC is charged with the management of Nepal's Protected Areas and has played a lead role in tackling many of the issues described above. The crucial role of the former Nepalese Royalty in protecting nature by initiating the establishment of national parks and reserves is generally acknowledged; and the dedicated and disciplined workforce of the DNPWC have since been responsible for keeping the original, and the new, protected areas intact (Bhatt 2003; Mishra 1982). In the wider conservation community, there is some dispute about the role of NGOs, including some accusations that these organizations do not fully support conservation goals (Avant 2004); however in Nepalese PA management, NGOs are viewed as key collaborators of the state conservation agency (Allendorf et al. 2007; Bajimaya 2003).

Many projects and programs targeted towards resolving the problems within Nepal's protected areas have been approached collaboratively by the DNPWC and other government agencies (such as the DoF), together with non-governmental conservation agencies (such as National Trust for Nature Conservation-NTNC and WWF). Some examples include: the Park and People Project (described above), the Bardia Integrated Conservation Project and People-Plant Initiative. The Bardia Integrated Conservation Project supported conservation programs of Bardia National Park during 1995-2001. It included actions ranging from water hole construction and grassland management to the development of infrastructure for buffer zone communities (e.g. establishment of a bio gas plant, support for the local school etc.). The Plant-People Initiative was launched in Shey-phoksundo National Park during late 1990s. This project enhanced the capacity of local traditional healers by providing training and documented the high value medicinal plants of the region (Hamilton 2013).

Community participation in conservation has been a major achievement in the management of Nepal's national protected area estate, especially given its history of conflict regarding access to resources. Success has been achieved through well-institutionalized buffer zone user groups, user committees and management committees. Laws and acts have been altered in order to reduce land use conflicts and involve participation of local people in conservation. For example, permission for the collection of reeds and other thatching materials in lowland PAs was granted through an amendment of the inhibitory NPWC Act 1973. In the highland mountain parks, local people are allowed to graze domestic stock in designated areas and collect dried firewood and construction timber (at low cost) from prescribed locations and in limited amounts (Jones 2007; Sharma 1990). Further, the fourth amendment of the NPWC Act 1973 contributed to a reduction in conflict and an increase in tolerance to losses due to wildlife of the parks (Silwal et al. 2016). This fourth amendment allowed local communities to access forest resources including timber forthe maintenance of community assets such as schools, bridges, temples or monasteries. This concession to local communities, which allows access to the resources of protected areas and buffer zones at sustainable levels, has had positive conservation outcomes and created positive relations with local communities (Sharma 2012).

The establishment of the National Wildlife Crime Control Coordination Committee in 2010, chaired by Minister for Forests and Soil Conservation has been a landmark step in conservation in Nepal and has played crucial role in minimizing wildlife crimes. This committee is comprised of high-level bureaucratic officials and representatives of law enforcement agencies (Appendix 4). It has various achievements such as the identification of poachers living abroad through collaborations with INTERPOL. Nepal has reported outstanding performances in enforcing international conventions such as CITES and Ramsar. Wildlife Crime Control Bureaus have been established at central and district levels to ensure that crimes related to wildlife are addressed effectively (Acharya & Kandel 2012). The poaching of iconic species such as tiger and rhinoceros has reduced remarkably and there have recently been several years such as 2011 and 2015 for rhinoceros and 2013 for rhinoceros and tigers in which no rhinoceros or tigers have been taken. These 'zero poaching years' were marked and celebrated within Nepal.

At a regional level, Nepal has been actively involved in the activities of the South Asia Wildlife Enforcement Network (SAWEN) and has hosted the secretariat of SAWEN. Transborder meetings and workshops with colleagues from India and China have been important in addressing wildlife crimes. Voluntary mobilization of local youths in community based anti-poaching units (CBAPU) has been another successful approach resulting in decreased poaching and hunting by local people in Bardia and Chitwan National Parks. It is intended that the activities of the Bardia and Chitwan CBAPUs will also be replicated in other PAs in Nepal.

The prevention and mitigation of human-wildlife conflict has also been a priority area for Nepal's DNPWC. Again, a combination of regulatory changes and practical actions has resulted in successful outcomes. The introduction of the Wildlife Damage Relief Guideline in 2009 facilitated compensation payments to people whose crops and livestock are damaged by wildlife and

was a key step in encouraging harmonious relationships between park managers and local people. It provides clear thresholds and limits for various losses such as human death, injury, livestock loss, and crop damage, either in the field or after harvest. It is expected that revenge killing of wildlife will cease as a result of this practice. Recent revision (in 2015) of the amounts paid in compensation has further improved the situation. For example, in the fiscal year 2012/2013, there were five human injuries and nine deaths due to tiger attack in Chitwan National Park, and the National Park Authority distributed NRs 2,200,000 (~US $22,000) in compensation. During the same period, tigers killed nine goats, one buffalo and two cows in Chitwan National Park; and NRs 75,500 (~US $755) was provided in compensation for these livestock losses (CNP 2013). This guideline has enabled the DoF and the DNPWC to allocate budget towards wildlife damage by some endangered species whose population would otherwise be at risk due to human wildlife conflict and which are given special protection status by law.

In addition to providing compensation, government conservation agencies have also worked with local people to reduce the frequency of wildlife damage to crops and community assets. This has taken the form of support for local communities in trench making, electric fencing and watchtower construction and supplying powerful torchlight, binoculars etc. Processing plants and seeds for crops which are less attractive to wildlife, such as mint and chamomile, and which have higher cash yields than conventional crops, have also been provided for communities living adjacent to some protected areas such as Bardia National Park and Shuklaphanta Wildlife Reserve.

Tourism management has become a prominent part of PA management and considerable efforts have been made to divert tourists away from areas that are suffering from high visitation rates and toward other PAs. This has been achieved through a combination of a central developmental plan and local efforts. It has involved engaging with the media to promote the less well-known areas; and physical development of visitor facilities across the park estate. The establishment of the National Tourism Board has played a significant role in these achievements. Tourism management has become a prominent feature of PA management in the country, and within each PA, visitor management is a key aspect. There is at least a small visitor information center as a key feature of each park.

To control and eradicate encroachment of private land uses across protected area boundaries, management authorities have coordinated with local and central police and administrative agencies. In some protected areas (such as Shuklaphanta Wildlife Reserve, Chitwan National Park and Parsa Wildlife Reserve) the encroached land area has been evacuated and restored to park management.

Addressing the issues of budgetary constraint has underpinned and facilitated the successful approaches described in the preceding paragraphs. Nepal's primary conservation agency, DNPWC, has been actively involved in the coordination of national and international non-governmental organizations such as USAid, United Nation's Development Program, WWF, NTNC, World Bank, Program Work on Protected Area, Bird Conservation Nepal, and the Mountain Institute etc. These organizations have directly funded many conservation programs, or have indirectly supported conservation projects through community-outreach programs and activities. Funds obtained as carbon credit from the REDD mechanism are anticipated to be an important source of revenue for Nepal's protected areas (Scharlemann et al. 2010). Nepal has already prepared a readiness plan for REDD and a REDD Implementation Centre has been established under the MoFSC in order to carry out programs associated with REDD. A list of major achievements in protected area management has been presented in Appendix 5.

4 Looking to the Future

Growing populations are likely to continue to place pressure on the natural resources of protected areas. Conflict with local communities should be promptly resolved either by providing more tangible benefits or by contributing more in local developmental activities (Spiteri & Nepal 2008).

A reduction in the dependency on natural resources of PAs is another good strategy to reduce conflict (Bajimaya 2003; Sharma 1990; Spiteri & Nepal 2008). In this regard, installation of biogas energy (for cooking) in all buffer zone communities throughout the country should be continued. Biogas availability is currently limited to communities in only some of Nepal's protected areas. Significant health and environmental benefits occur in communities that replace fuel wood with biogas for energy requirements for cooking (Gautam et al. 2009). It could also be possible to use invasive species such as *Lantana camera* to make bio briquettes, which doubles the positive ecological effect (control of invasive species and reduced pressure for firewood collection).

To reduce the impact of visitors, limited numbers of visitors per day should be fixed and the number of park entry points should be increased. For example, in Bardia National Park, a second entry point could be established via the Babai Valley. Reducing visitor pressure at the current entry, introducing a code of conduct for visitors, which includes maintaining a minimum distance from wildlife, might help in reducing the impact of visitors on wildlife (Quiros 2007). Continued development and promotion of other protected areas, which have historically received fewer visitors though they have high potential, such as Rara National Park, Khaptad Natioanl Park and Shey-Phoksundo National Park is also necessary to promote tourism and reduce the pressure on Chitwan, Bardia, Langtang and Sagarmatha National Parks.

The introduction of zoning in the Himalayan National Park may be a solution to the impact of grazing livestock on biodiversity hotspots. Allocating land for grazing which is separate from the areas important for wildlife may lead to better outcomes. Likewise, temporary bans on grazing in habitat used by red panda (*Aiulurus fulgens*) during the breeding season in Langtang National Park (LNP 2006) could help to reduce impacts of domestic stock on wildlife. Further, a focus on replacing large numbers of less productive livestock with smaller numbers of productive breeds will reduce grazing pressure on parks and reserves. The National Development Plan for Nepal should incorporate the use of improved and highly productive breeds of domestic cattle.

The economic situation of local people also needs consideration. Successful wildlife conservation has local economic benefits in the form of environmental tourism. However, these benefits largely go to hotel and restaurant owners, whereas local famers often bear the costs of successful conservation in the form of crop raiding and livestock loss (Spiteri & Nepal 2008). Therefore, a system of payment for ecosystem services, which benefits local people including tourism entrepreneurs and local farmers, including revenues for compensation when livestock/crop loss occurs, may provide an equitable benefit sharing mechanism, which is the main objective of CBD.

Though the Wildlife Damage Relief Guideline 2009 (revised in 2015) has played a positive role in conservation, the lengthy and cumbersome process of fund release must be revised. At present the regional forest directorate releases the budget which delays the process because required documents from claimants are collected at relevant Parks and Reserves and then forwarded to the DNPWC. DNPWC then forwards the documents to relevant regional forest directorates and finally funds are released to the PA, and payment is made to the claimant. It sometimes takes six months to release the funds. Relevant PAs should have the authority to process wildlife damage relief and compensation cases.

Maximum sustainable resource extraction from multiple use zones (such as buffer zones) can be encouraged to fulfill the resource needs of local people. Use limits should be evidence-based and should optimize utilization of resources to fulfill the resources needs of local communities without damaging the integrity of protected ecosystems. Such approaches can also contribute to poverty reduction by generating earned revenue for local people. The excavation of boulders, stones and sand from the fragile Siwalik region should be stopped immediately to protect the biodiversity of the region and to maintain the underground water recharge system for the lowlands. The many hydroelectric dams proposed to be developed inside protected areas should, wherever possible, be shifted outside the PA where biodiversity losses will be minimized.

Research and monitoring should be an integral

part of PA management. For this, the focus of the Department of Forest Research and Survey under the Ministry of Forests and Soil Conservation should extend beyond the biomass survey (important for REDD accounting) to include other aspects of biodiversity monitoring. There are considerable opportunities to collaborate with national and international universities to design robust and meaningful research and monitoring programs across Nepal's protected area estate. University student interns can be involved in periodic programs like wildlife censuses and occasional events such as translocations of individual animals.

There is a need for an intensive conservation education and awareness program for all Nepali people, and for international visitors to Nepal's protected areas. The curriculum of schools should contain a conservation education component and non-formal education should also be emphasized.

5 Conclusions

Approaches to the management and governance of Nepal's protected area system has shifted from a strict protectionism approach to a participatory management model over time, as the country's socio political systems have advanced to a more democratic system. When protected areas were first established in Nepal, the traditional use of resources by local communities was ignored in favour of an emphasis on the protection of large wildlife species (Kollmair et al. 2003). When people encroached the park regulations strong actions were taken however damage by wildlife encroaching on human communities was not compensated (Gurung 1998). The scenario gradually changed after the 1980s due to the introduction of a different model of nature conservation, focusing on integrated conservation and development. This model achieved the objectives of wildlife conservation in parallel with development of the local human communities. At later stages, site based conservation approaches were modified to landscape scale conservation and the concept of conservation for the people was adopted. The role of local communities in nature conservation within Nepal has changed considerably along with the changing management paradigms of the protected area system (see also Appendix 2). Participatory conservation models (including community-managed buffer zones and conservation areas) are now common throughout the country, though they may be at risk due to lack of sustainable funding to manage local development activities. Protected area managers in Nepal will have ongoing and emerging problems to address in the future. Continued effort and new ways of solving problems will be necessary in order to continue to preserve Nepal's significant wildlife and unique protected areas.

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