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Landscape Level Efforts to Biodiversity Conservation in Nepal: A Review of Current Approach and Lessons Learned

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Abstract

Nepal's location in the centre of the Himalayan range places the country in the transitional zone between the eastern and western Himalayas. Nepal's rich biodiversity is a reflection of this unique geographical position as well as its altitudinal and climatic variations. It is recorded that Nepal has a total of 118 types of ecosystem, 75 vegetation and 35 types of forests. Nepal has put utmost efforts to conserve its rich biodiversity resources. The conservation history began formally after promulgation of National Parks and Wildlife Conservation Act in 1973. National parks and wildlife reserves were established across the country during the 1970s. However, very soon not only some of the adversities were faced by the local people living around the parks and reserves but also the space constraint was realized for the population distribution and dynamics. By realizing the need of people's participation in the conservation initiatives, country has tested the concept of different types of protected areas system such as national park, wildlife reserve, conservation areas, and buffer zones over the years. Taking the advantage of new progresses in conservation biology, Nepal adopted landscape level approach to biodiversity conservation and implemented such approaches in some of the key areas since 2000s. This paper discusses Nepal's effort in implementing landscape level approach to biodiversity conservation and the lessons learned at national context.

Keywords

Biodiversity, Conservation, Landscape, Protected area

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Introduction

The many different interpretations of the term "landscape" make it difficult to communicate the concept clearly, and even more difficult to establish consistent management policies. Forman and Godron (1986) defined a landscape as "a heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout." After species conservation and community-based conservation, the emergence of 'landscape-level', or 'landscape-scale' conservation was a marked shift in Nepal's system of biodiversity conservation, especially, in protected area management. Nepal was one of the first countries to realize that the dispersal of mega fauna (large animals) requires large tracts of varied habitats and that landscapes with heterogeneous habitats and ecosystems have more biodiversity because they include species found in several different sites or protected areas, that is the 'beta-diversity effect' (Sharma and Chettri, 2005).

Landscape level conservation is new paradigm in conservation arena crafted to address the issues of expanding human needs and their pressure on the ecosystem. In this initiation, conservation is extended beyond the boundary of protected area to cover larger landscape of different land-use patterns. The landscape approach to conservation includes the integration of conservation and sustainable use concept in various interwoven land use systems across human and biodiversity landscape. It advocates for conservation of biodiversity resources beyond protected areas and humans are considered as an integral component of an ecosystem. Landscape level conservation, thus, has been a realized management practice today. Nepal's commitment to save and secure biodiversity is evidently reflected with the creation of an impressive network of protected area system and supportive policies and legislation. As these areas are now turning out to be an island amidst human dominated landscapes, landscape level conservation appears as appropriate solution (Bhuju and Tuladhar, 2011). The landscape level conservation approach being practiced in Nepal holds an exciting possibility to effectively deliver conservation plans and programmes. Landscape approaches are also imperative to conserve the ecosystem goods and services that support human lives, livelihoods, and economic development. Therefore, conservation and development must be harmonized and integrated to provide benefits to the people and national economic growth. This is even more important in an era when climate change is emerging as a global force that will change territories where the people and wildlife will live, compete for resources, and survive. This paper aims to present an overview of Nepal's current effort in implementing landscape level conservation approach to biodiversity conservation and the lessons learned in national context.

Materials and Methods

This paper is based on the desk review of the published and unpublished literature from different sources including web-based resources. The information collected were systematically reviewed for logical discussion and conclusion.

Review and Discussion

Nepal's Biodiversity

Nepal is natures' paradise. It is a small attractive package of nature embracing the rich biological diversity in the tiniest area. Nepal's unique geography with its dramatic changes in elevation along

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the short (150-250 km) north-south transact. Associated high variability in the physiographic and climatic conditions have resulted in a uniquely rich diversity of flora and fauna in the country. The country comprises only 0.1% of the world's land masses, but it harbors 3.2% and 1.1% share of global floral and faunal biodiversity, respectively (MoFSC, 2014). A total of 118 ecosystems have been identified in Nepal, with 75 vegetation types and 35 forest types (MoFSC, 2014). Species richness among floral diversity comprises 465 species of lichens (2.3 % of the global diversity), 534 species of pteridophytes (5.1 % of the global diversity), 1,150 species of bryophytes (8.2% of the global diversity), 26 species of gymnosperms (5.1 % of the global diversity) and 6,973 species of angiosperms (3.2% of the global diversity). Likewise, faunal diversity includes 651 species of butterflies and 3,958 species of moths (together constituting 7.3 % of the global diversity), 867 species of birds (9.5% of the global diversity), 123 species of reptiles (1.9% of the global diversity), 17 species of amphibians (2.5% of the global diversity), 230 species of fish (1.9% of the global diversity) and 208 species of mammals (5.2% of the global diversity) (MoFSC, 2014). The country has established an impressive network of protected areas (national parks, wildlife reserves, hunting reserves, conservation area, and buffer zone) to safeguard its rich biodiversity resources. About 23.39% (34,419.75 sq. km) of the land mass of the country is occupied by the protected area network including 3.86 % (5687.78 sq. km) buffer zone network (DNPWC, 2018).

Nepal and its Conservation Initiatives

Nepal, on the southern slopes of the Himalayas, has a landmass (147,181km^2) only slightly larger than England (130, 395 km^2), yet the country contains over 3% of the world's flowering plants, 9% of its birds and 5% of its mammals (MoFSC, 2014). This biodiversity richness is a reflection of the country's unique geographical position as well as its altitudinal and climatic variations, ranging from lowland tropical Terai[1] to Mt. Everest, the highest mountain in the world. The country is also rich in ethnic diversity comprising more than 102 caste/ethnic groups with about 93 spoken languages. These people have rich and diverse socio-cultural practices and possess a wealth of knowledge on the use and management of biodiversity. This rich repository of natural and cultural diversity is a characteristic of Nepalese landscapes that has both national and international significance and is a key focus for conservation.

Over the past few decades Nepal has experienced enormous challenges in conserving the country's biodiversity, from the mountains to the Terai. Nepal's conservation history can be dated back from 1950. Conservation initiatives have been taken through establishing a Rhino Sanctuary (now as known as Chitwan National Park) in Chitwan in 1956. The main objective of the sanctuary was to protect the one-horned rhinoceros (*Rhinoceros unicornis*). The conservation history began formally after promulgation of National Parks and Wildlife Conservation (NPWC) Act in 1973. After the promulgation of NPWC Act 1973 the conservation efforts attained momentum and the country embarked on the modern era of conservation by establishing extensive networks of protected areas system. Most of the national parks and wildlife reserves (including Chitwan National Park: first national parks of Nepal) were established during 1970s. During that period the main objective of the protected areas was to protect wildlife species including endangered rhinoceros, tigers, and wild elephants (Sigdel *et al*., 2007). During 1980s, people-centered approach in protected area

[1] Terai: A low land region in southern Nepal and northern India that lies south of the outer foothills of the Himalayas, the Siwaliks hills and north of the Indo-Gangetic plain. The region lies at an altitude of 57 m to 300 m between Indian borders in the south and the outer foothills of Churia in the north.

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management was evolved. During this period, the government also added conservation areas[2] in protected area network, which emphasized higher people's participation in conservation arena (Sharma, 1995). During 1990s, the government introduced the new policy of sharing part of the protected areas' revenue with adjoining communities by establishing buffer zones[3]. With this new concept, the traditional species conservation approach had shifted towards ecosystem-based approach of biodiversity conservation (Sigdel *et al*., 2007). The concept of buffer zone in and around protected areas was introduced in 1993 following the realization that sustainable wildlife conservation is possible only by active participation of local people (Maskey, 2001). Fourth amendment was made in National Parks and Wildlife Conservation Act 1973 in 1993 and introduced the regulation of sharing 30-50% annual income of protected areas with buffer zone communities. The government envisioned conservation areas and buffer zone management regime to achieve effective management of national parks and reserves, while at the same time giving due regard to the local communities (Sharma, 2001). To address the issues of expanding human needs and their pressure on the ecosystems the government of Nepal has introduced the concept of landscape level conservation legally in the fifth amendment of National Parks and Wildlife Conservation Act 1973 in 2017.

Existing Landscape Level Conservation Programs

Nepal has been embarking towards landscape approach to conservation in the new millennium since 2000s. It has been trying to balance protective and participatory approaches to resource conservation simultaneously (Sigdel *et al.*, 2007). The landscape approach to conservation has been adopted to enhance ecological integrity and conservation of endangered species, as many of the protected areas are like islands and too small to support viable population of endangered species and ecological processes. With the support of various national and international partner organizations, the government of Nepal has implemented various landscape conservation programs within a short span of time. Within four decades, Nepal's protected area management strategies have changed from 'island' to 'network' approaches, which integrate various social as well as ecological dimensions (Figure 1).

In line with conserving biodiversity resources at landscape level, the Ministry of Forests and Environment with the support of various donor communities, including United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), Global Environment Facility (GEF), World Wide Fund for Nature (WWF), and Netherlands Development Organization (SNV) has been implementing landscape management programmes in three important landscapes, namely the Tarai Arc Landscape, Sacred Himalayan Landscape, and the Kailash Sacred Landscape. Another landscape management programme has been initiated by a consortium of international non-governmental organizations (INGOs) and non-governmental organizations (NGOs) in the Chitwan-Annapurna Landscape since 2011 under United States Agency for International Development (USAID) funding.

[2] Conservation area: Protected area that is designated to conserve ecosystem and habitats, together with associated cultural values and traditional resource management systems and that is included in VI category of IUCN protected area category.

[3] Buffer zone: A peripheral area of national parks or reserves prescribed to provide forest resources on a regular basis for the local people.

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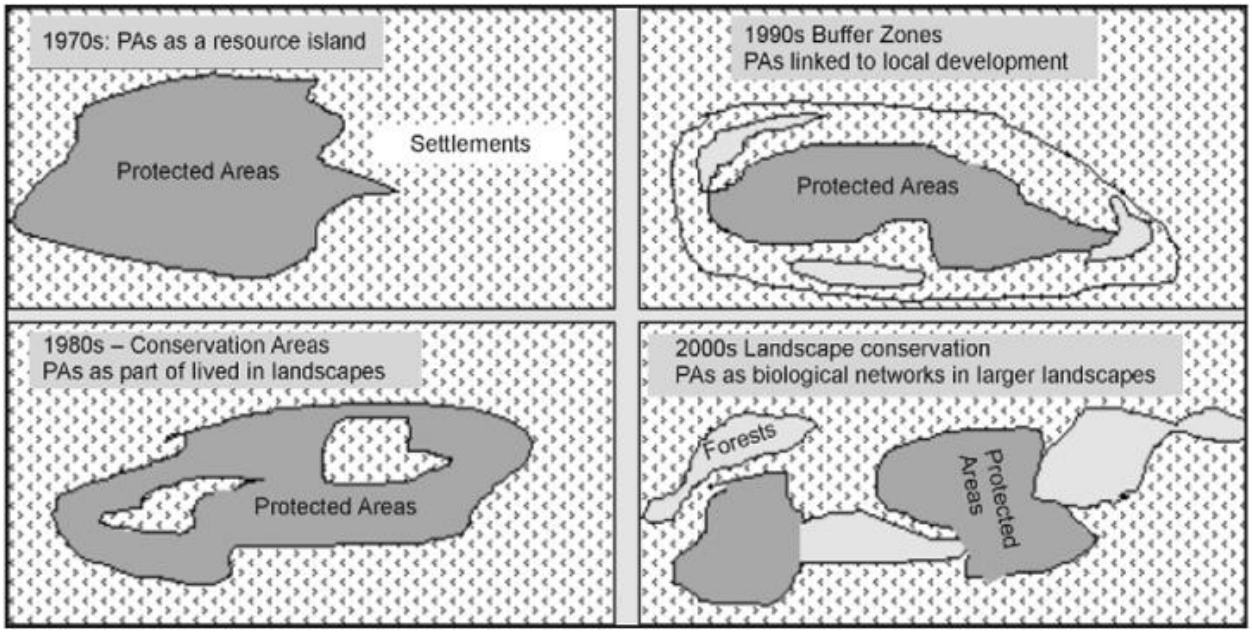

Figure 1: Shifting Conservation Paradigms: from Island to Networks (adapted from Bhuju and Tuladhar, 2011)

Terai Arc Landscape (TAL)

Terai Arc Landscape (TAL) programme was initiated in 2001, and it is being jointly implemented by Department of National Park and Wildlife Conservation of the Ministry of Forest and Environment and the WWF Nepal in collaboration with the local communities and NGOs. The overall goal of TAL is to conserve the biodiversity, forest, soil and watersheds of Terai and Churia hills in order to ensure the ecological, economic and socio-cultural integrity of the region. It spreads over 51,002 sq. km, from Bagmati River in Eastern Nepal to Western Yamuna River in India linking 14 trans-boundary protected areas (6 from Nepal and 8 from India) across Nepal and India. TAL is home to flagship species like the Asiatic wild elephants, rhinos, and tiger. It encompasses 24,710.13 sq. km of 18 districts including 75 percent of the remaining forests of lowland Nepal including Churia hills and 6 protected areas. This landscape has the second largest populations of rhinos and one of highest density of tiger populations in the world. TAL covers three Ramsar sites and two World Heritage Sites (MoFSC, 2015). TAL was prioritized by government of Nepal as a priority programme in the 10th Plan (2002-2007). Some notable achievements have been reported in restoration of forest, grassland and wetland habitats and increase in population of several important wildlife species, including tiger, swamp deer and blackbuck, and conservation of local varieties of crops in the Western Tarai Landscape Complex (Acharya, 2012). To protect the biodiversity of this landscape government of Nepal has endorsed the forests to be included in TAL Strategy and Action Plan 2015-2025 in2015 (MoFSC, 2016).

Sacred Himalayan Landscape (SHL)

The Sacred Himalayan Landscape (SHL) is a trans-boundary conservation programme, located mostly in Nepal (59.80%) but also includes land of Sikkim and Darjeeling in India and a small area in Bhutan. It spreads from Langtang National Park of Nepal to Kangchanjunga region of Sikkim and Darjeeling, India to Tursa Strict Nature Reserve, Bhutan. It spreads over 39,021 sq. km across

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Nepal, India and Bhutan and its area in Nepal is 23,336. 36 sq. km that covers 17 districts of Nepal. It links the Qomolangma National Nature Preserve in the Tibet, one of the largest protected areas in Asia, with the Kangchanjunga Landscape in India and the Bhutan Biological Conservation Complex in Bhutan. About 22% of the area includes four of Nepal's protected areas: Langtang National Park, Sagarmatha National Park, Makalu Barun National Park, and the Kanchanjunga Conservation Area. Trans-boundary protection of its biological and ecological connections is critical for the survival of such species as the snow leopard, the red panda and the musk deer that are threatened throughout the world. The MoFSC has developed and implemented a 10-year SHL Strategic Plan (2006-2016) for long-term sustainable management of biodiversity, local culture and water resources in the Nepal side of the Sacred Himalayan Landscape (MoFSC, 2016).

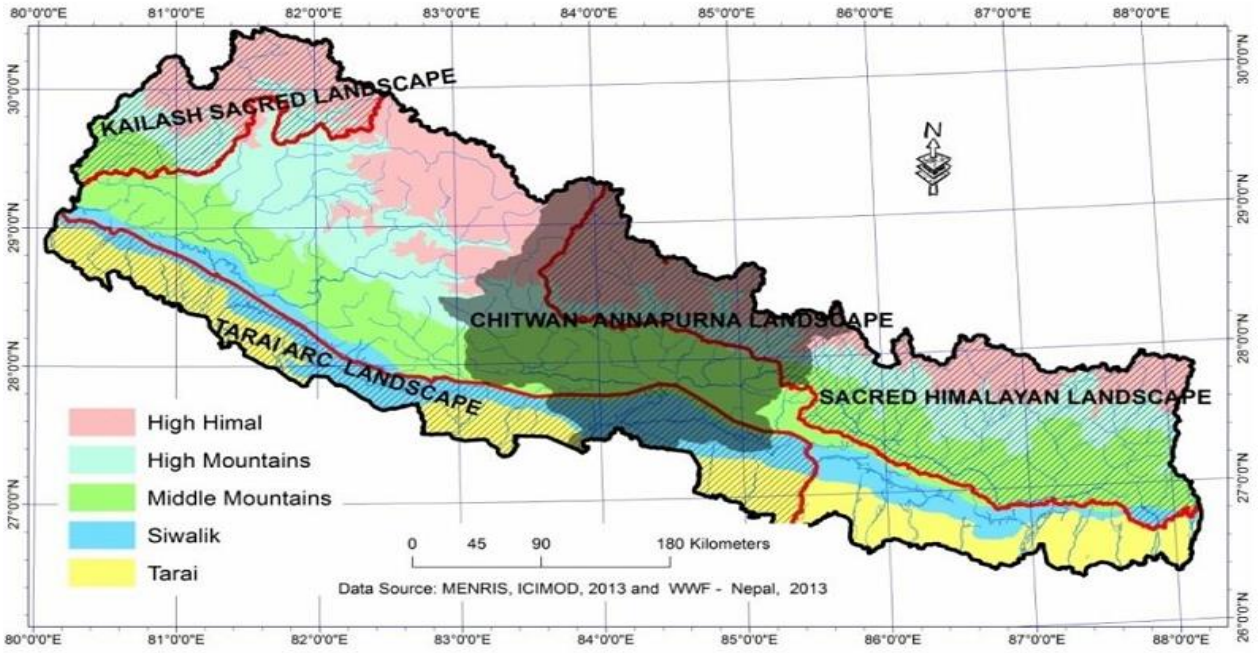

Figure 2: Landscape Conservation Complex under Management in Nepal (adapted from NBSAP, 2014-2020)

Kailash Sacred Landscape Conservation Initiative (KSLCDI)

The Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) is a trans-boundary collaborative programme between China, India and Nepal that has evolved through a participatory, iterative process among various local and national research and development institutions within these countries. The main components of the KSLCDI include: (i) innovative livelihoods, (ii) ecosystems management, (iii) access and benefit sharing, (iv) long-term environmental and socio-economic conservation and monitoring, and (v) regional cooperation. The programme aims to achieve long-term conservation of ecosystems, habitats, and biodiversity while encouraging sustainable development, enhancing the resilience of communities in the landscape, and safeguarding the cultural linkages between local populations. Located within the remote southwestern portion of the Tibet Autonomous Region of China, adjacent districts in the Far-Western region of Nepal, and the northeastern flank of Uttarakhand State in northern India, the Kailash Sacred Landscape (KSL) is spread over an area of about 31,000 sq. km and represents a

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diverse, multi-cultural, and fragile landscape. Currently, the Governments of Nepal, India, and China, with the support of International Centre for Integrated Mountain Development (ICIMOD) have been implementing the Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) to achieve the long-term conservation of ecosystems, habitats, and biodiversity while encouraging sustainable development, enhancing the resilience of communities in the landscape, and safe-guarding the cultural linkages of local populations. KSL Nepal covers 13,246.18 km^2 in four districts of Nepal: Humla, Bajhang, Baitadi, and Darchula (MoFSC, 2016).

The Chitwan Annapurna Landscape (CHAL)

The Chitwan-Annapurna Landscape (CHAL) in central Nepal is known for its rich biodiversity. It exhibits much scenic beauty, ranging from the rain shadow of the trans-Himalayan area and the snow-capped mountains of Annapurna, Manaslu and Langtang in the north, descending southwards through diverse topography to the mid-hills, Churia range and the flat lowlands of the Terai. The landscape is drained by eight major rivers (Kali Gandaki, Seti, Madi, Marsyangdi, Daraundi, Budi Gandaki, Trishuli, and Rapti) and their tributaries of the broader Gandaki river system. The coverage of CHAL has been described to include the whole of the Kali Gandaki River Basin in Nepal, encompassing all or part of 19 districts with all or part of six protected areas. The districts represented in CHAL are Mustang, Manang, Gorkha, Rasuwa, Nuwakot, Dhading, Lamjung, Tanahu, Chitwan, Nawalparasi, Syanja, Kaski, Parbat, Baglung, Myagdi, Gulmi, Arghkhachi, Makwanpur, and Palpa. Chitwan and Nawalparasi Districts overlap both Terai Arc Landscape (TAL) and CHAL. The protected areas are Chitwan National Park (CNP) and its Buffer Zone, a portion of Parsa Wildlife Reserve (PWR) and its buffer zone, Shivapuri Nagarjung National Park (SNNP), Annapurna Conservation Area (ACA), Manaslu Conservation Area (MCA), and a portion of Langtang National Park (LNP) and its buffer zone. The proposed landscape is 32,090 sq. km, which covers 11.4 percent in the Siwaliks, 37.8 percent in the mid hills, and 50.8 percent in the mountains. The CHAL has high biodiversity value and rich natural and cultural heritage. It is an important transit route for migratory birds and is home to endangered species like snow leopard, red panda and Himalayan black bear. The CHAL is a portion of larger landscape, the Greater Himalayan Landscape; the latter, conceived during a workshop organized for developing a biodiversity vision in Nepal in December 1999 (WWF and ICIMOD, 2001). Of the 17 priority "Conservation Landscapes" identified at that time, this Greater Himalayan Landscape, covering a vast area of 69,200 sq. km, was intended to provide adequate space for large vertebrates and facilitate ecological processes dependent on altitudinal connectivity (MoFSC, 2016).

The Kangchenjunga Landscape (KL)

The Kangchenjunga Landscape (KL) is one of the six trans-boundary landscapes identified by the International Centre for Integrated Mountain Development (ICIMOD) in the Hindu Kush Himalayan (HKH) region. This important trans-boundary landscape provides valuable ecosystem services that support the wellbeing and livelihoods of people living in the landscape, as well as millions living downstream. Stretched along the southern slope of Mount Kangchenjunga, the Kanchenjunga Landscape covers an area of 25,080.8 km^2 and spreads across part of eastern Nepal (21% of total KL area), Sikkim and West Bengal of India (56%), and the western and south-western parts of Bhutan (23%). KL Nepal is contiguous with the Quomolangma Nature Reserve in Tibet (China), providing habitat connectivity for alpine mammals, especially snow leopard, as recommended by WWF and ICIMOD (2001). To the east, it maintains connectivity with the

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Kanchendzonga protected areas complex in Sikkim, India. The landscape was designed originally for trans-boundary conservation and cooperation among Nepal, India, and Bhutan. KL Nepal covers an area of 5,190 km^2 stretched across four districts: Taplejung, Panchthar, Ilam (partly) and Jhapa (MoFSC, 2016). Other two conservation landscape complex such as Karnali Conservation Landscape (KCL) and Eastern Chure Terai Complex (ECTC) were also proposed for addressing the issues of landscape level conservation (MoFSC, 2016).

Lessons Learned

Nepal has made several strategic changes in its conservation policy to suit the needs of the changing times since it embarked on modern era of biodiversity conservation with the establishment of Chitwan National Park in 1973. The strict law enforcement practices of the early years have gradually given way to a more conciliatory approach with the participatory involvement of local people in biodiversity conservation. At the later stage conservationists felt that the protected area system dealt with only limited issues of biodiversity conservation and neglected other related issues that originated outside the protected areas. Wildlife knows no political boundary and it would be difficult for the island-like national parks and wildlife reserves to contain and ensure the long-term survival of mega terrestrial wild animals with equally large home range.

Bringing community engagement and development interventions into conservation programmes has enabled the expansion of a broader conservation mandate, which is beginning to result in a broader sense of conservation stewardship among people in the landscape, while improving their livelihoods and socio-economic prosperity. However, approaches to conservation at the landscape scale are still weak at the operational level, which is a major gap. The coordination between different sectors is inadequate, resulting in activities that are in conflict for resource use, especially for land use, land allocation, and water use and extraction. DNPWC, WWF, ICIMOD, NTNC and IUCN have been active in landscape scale conservation, but there is still a lack of ownership of the concept among government sector offices, such as Department of National Park and Wildlife Conservation, Department of Forest and Soil Conservation, Department of Agriculture and Department of Physical Planning and Construction. Thus, it is important to note that landscape scale conservation is a strategic approach of the Nepal government and, therefore, all government agencies, NGOs and INGOs need to operate their plans and programmes according to the spirit of these conservation objectives.

Conclusion

Today landscape level conservation has gained widespread acceptance across the world as the paradigm for sustained, long-term conservation of biodiversity. Landscape approaches are also imperative to conserve the ecosystem goods and services that support human lives, livelihoods, and economic development. The biodiversity conservation policy and practice has been heading towards more of progressive and participatory management system. Local people are placed in the center of the biodiversity conservation and management. Recognizing the role and importance of people and their livelihoods in landscapes for the long-term conservation of biodiversity, Nepal has been adopting new models for conservation over the last two decades. The conservation paradigm has shifted from species conservation approach to larger landscape conservation planning. Within a short span of time these programmes have been able to change people's attitude towards biodiversity conservation, even outside of the protected area system. Therefore,

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conservation and development must be harmonized and integrated to provide benefits to the people and national economic growth. This is even more important in an era when climate change is emerging as a global problem that will change the landscape where people and wildlife live, compete for resources, and survive.

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