Report

Man and Biosphere (MAB) and Necessity of Biosphere Reserve in Nepal

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Introduction

Man and Biosphere Programme is an intergovernmental scientific programme, launched in 1971 by UNESCO that aims to establish a scientific basis for the improvement of relationships between people and their environments. The origin of this is "conference on Biosphere" organized by UNESCO in 1968. This was the first intergovernmental conference focusing to economic and social development to support the sustainable development through conservation of biodiversity. It is not satisfactory to keep the people far from the nature. The people always interact with nature and natural lives interact with the human beings. Realizing this, UNESCO designates sites to encourage national governments and local communities to identify special sites and work together to ensure their conservation and sustainable use for current and future generations. Man and Biosphere currently operates through 158 National Committees established among the 193 members States and 11 Associate Members States of UNESCO. These are 79 sites in 29 countries in Africa, 33 sites in 12 countries in the Arab States, 302 sites in 38 countries in Europe and North America, 130 sites in 21 countries in Latin America and the Caribbean and 157 sites in 24 countries in Asia and the Pacific. The chronology of MAB activities is presented in table 1.

Table 1: chronology of Man and Biosphere activities

1975	Regional meeting on Integrated Ecological Research and Training Needs in the Southern Asian Mountain Systems in particular The Hindu Kush-Himalayas, Kathmandu, 20 Sept – 2 Oct, 1975
1983	As per recommendation of UNESCO Regional Meeting in Kathmandu, ICIMOD got established in 1983 in Nepal within the framework of the MAB programme
1980s and 90s	Research activities conducted under the MAB programme
1995	MAB bulleting published by Nepal National Commission for UNESCO (Nepal NatCom) on 5 June 1975 For more information on National Commissions for UNESCO https://en.unesco.org/countries/national-commissions a national cooperating body set up by the respective government in accordance with the Article VII of the UNESCO Constitution, to operate, on a permanent basis, **for the purpose of associating the governmental and non-governmental bodies** in education, sciences, culture and communication with the work of the Organization.
1998	UNESCO Office in Kathmandu established

1990-2000	Political instability, MAB activities diminished
2006	Article published on the journal of forestry information for Nepal, the Banko Janakari, called *"An overview of the Biosphere Reserve concept and its application to Nepal*" by the Deputy General Director of the Department of Forest Research and Survey, Shree Gopal Jha, which provided an overview on the concept and mentioned the Langtang NP as the preferable site for establishing a BR.
2014	Department of National Parks and Wildlife Conservation (DNPWC) requested Kathmandu Office's assistance in identifying the potential site for the first biosphere reserve in Nepal
	UNESCO Kathmandu organized several meetings during the last 3 years as a result of several consultations jointly with colleagues from the Jakarta, New Delhi offices (Ram Boojh) and headquarters (Miguel Clüsener).
2014	Nepal represented at the 5th meeting of the SACAM (https://sacam-mab.com) held in Islamabad, Pakistan in 2014 Nepal is a founder member of the South and Central Asia MAB Network (SACAM)
2015	Due to the April, May earthquakes and the following crisis, the MAB activities postponed
	New Constitution of Nepal promulgated in 2015 followed by Federal Election in 2017
September 2015	Interaction session held among the UNESCO experts on Biosphere Reserves (BR) from HQ (Miguel Clusener-Godt) and New Delhi (Dr Ram Boojh), and Nepal Stakeholders represented by the related government Ministries and Departments, the NGO partners, Nepalese scientists, researchers and academia
	Stakeholders' suggested Kanchenjunga Conservation Area (CA), Annapurna CA, Langtang National Park and a joint area of Shivapuri-Nagarjun National Park as potential sites for BR for nomination
	Government of Nepal and UNESCO to work in collaboration to build further capacity on the UNESCO MAB programme in Nepal
early October 2015	Revival of a special MAB committee at Nepal National Commission for UNESCO (NatCom) with representatives of the focal government agencies and academia After the September 2015 workshop, the MAB Committee was established by the Nepal National Commission for UNESCO within a week from the workshop by appointing representatives of the government and academia without any consultation with the then Ministry of Forest and Soil Conservation (MoFSC) and disagreed with many individuals appointed by the NatCom as they are not current employees of the Ministry and therefore no government ownership. And then the fuel crisis and the government changed.

December 2015	Nepal represented at the 7th meeting of SACAM in Dhaka, Bangladesh, 14-15 Dec 2015
2016	UNESCO Kathmandu and NatCom MAB Committee Interaction programme, 10 June 2016
	UNESCO Inter-regional Science Cooperation Meeting and 3rd APBRN Strategic Meeting, Bali, Indonesia, 21-24 July 2016, represented by UNESCO Representative Christian Manhart and Prof Ram P Chaudhary from Natcom MAB Committee
	Nepal represented at the 8th meeting of SACAM in Almaty, Kazakhstan, 24-25 October 2016
	Strategy and Action Plan 2016-2017 for MAB programme in Nepal prepared by UNESCO Kathmandu to provide strategic direction and suggest possible activities for National MAB Committee
2017	The MAB special Committee at Nepal NatCom published a Nepali MAB brochure in 2017 - useful for awareness raising purpose.
2018	MAB special Committee commissioned an independent study on the potential sites for biosphere reserves in Nepal. Its summary is published in Nepal NatCom quarterly Bulletin, Mar-July 2018
	Nepal represented South East Asian Biosphere Reserve Network (SEABRNet) in Chiang Mai, Thailand in May 2018 that enabled further exchanges on support to Bhutan and Nepal to develop a MAB programme.
	UNESCO Kathmandu Office requested the Ministry of Forest and Environment to nominate focal-point from the Department of National Park and Wildlife Conservation
September 2018	The focal point, Mr Laxman Prasad Paudyal attended one day consultation meeting of the MAB focal points at New Delhi organized by UNESCO among Nepal, Bhutan and India. The meeting discussed the planning and agenda of the next SACAM meeting 2019 in South Asia and opportunities for collaboration between South Asian countries on Biosphere Reserves development and management. However, Mr Paudyal, soon transferred to outside Kathmandu duty station
November 2018	Meeting at Nepal NatCom with Science Committee Chair, Dr Ramesh Maskey, Man and Biosphere Reserve (MAB) Special Committee Convenor Prof Ram P Chaudhary and International Hydrological Program (IHP) Special Committee Convenor Dr Mahesh Prasad Bhattarai and Focal point Er Bikram Shrestha Zoowa from Department of Hydrology and Meteorology (DHM) during a Consultation mission of Guy Broucke, Programme Specialist for Natural Sciences, UNESCO New Delhi Cluster Office for Bangladesh, Bhutan, India, Nepal, Maldives, and Sri

	Lanka The MAB Committee welcomed the proposal of next SACAM meeting to be held in Bhutan and willing to send two participants from Nepal
April 2019	Meeting at Nepal National Commission for UNESCO, 17 April 2019 in the presence of Nepal NatCom for UNESCO then Secretariat's Secretary, Mr Khagaraj Poudyal, Dr Ram Chandra Kandel, then representing MAB committee were Deputy Director Department of National Parks and Wildlife Conservation, Prof Sanjay Khanal (School of Environmental Science and Management (SchEME), Pokhara University) and Ms Carolle Alarcon Eichmann (UNESCO Kathmandu) • in preparation of 9th SACAM meeting, 25-27 April, Bhutan • concept note for fund raising (Dr. Kandel's corrections and suggestions – mainly related to the BR sites, which should have a more landscape approach, and less focused on single PA. He stressed that the final approval of the concept note must be done directly at ministry level) • Ms. Eichmann presented the study proposal "Towards a BR nomination in Nepal" on the key information about the MAB Programme and the BR concept, its application to Nepal, as well as a good background of activities already held in the country. Secondly, on an overview of the potential sites already acknowledged for the BR nomination, and most important to move forward, proposing an initial decision and ranking matrix, with criteria and indicators of comparison, for discussion and improvement together with the DNPWC.
June 2019	Half-day Consultation Meeting with Man and Biosphere (MAB) Committee at Kathmandu, 16 June 2019 – present and discuss on the study Towards a Biosphere Reserve Nomination in Nepal
June 2019	One-day consultation at UNESCO with NatCom MAB Committee, 28 June 2019
July 2019	The Nepal Natcom MAB Special Committee organised an interaction programme at Birendranagar, Surkhet in Karnali Province, 7 July 2019. The mission was able to meet important delegates at Province level, in particular the high level participation: Minister and Secretary from the Ministry of Industry, Tourism, Forest and Environment, the State Planning Commission, the Chair of Provincial Assembly Committee on Finance and Natural Resource conservation, the Director-General of the Province Forest Directorate, the municipalities and other relevant stakeholders taking the process one step further. The report feedback points clearly indicates that the delegates are very much concerned on safeguarding of the rare resources of their localities, both natural and traditional knowledge the local community has and is practicing, which is a real asset to enhance the economy and human development aspect of the region, which can address through establishment of Biosphere Reserve in line with its 3 principle of conservation, development and logistic function.

2020	Proposed fact-finding mission to have local level consultation to the proposed Biosphere Reserve locations postponed The purpose is, in collaboration with all concerned authorities and stakeholders, to discuss on proper demarcation of its core, buffer and transition area, based on the proposed delimitation with Rara National Park as core, its buffer zone and the larger transition area, to be agreed upon with locals and authorities concerned or discuss for any other alternatives

Aim of Man and Biosphere: The new MAB strategy 2015-2025 emphasizes on to enhance the inyterlationship between and Man and nature. Thus, the aims of MAB are to ssupport member states to conserve biodiversity, enhance ecosystem services and foster the sustainable use of natural resources in one way. At the same to facilitate sustainability science, education for sustainable development and capacity building in another way including to support mitigation and adaptation to climate change and other aspects of global environmental change. Thus, the attraction of designation of Biosphere Reserve is increasing in developing countries as well.

Characteristics of Biosphere reserve

The biosphere is roughly corresponding to IUCN Category V Protected areas. In addition, this is participating in the World Network. Three interconnected functions are the main characteristics of the biosphere reserves. These are conservation, development and logistic support.

Conservation function: to contribute to the conservation of landscapes, ecosystems, species and genetic variation.

Development function: to foster sustainable economic and human development.

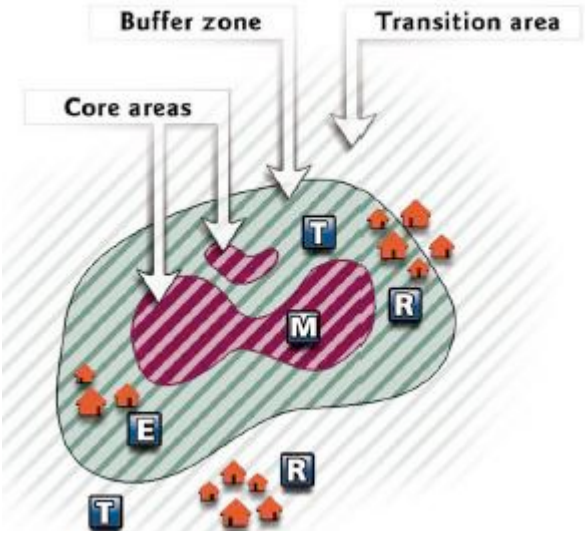
Logistic function: to support demonstration projects, environmental education and training, and research and monitoring related to local, national and global issues of conservation and sustainable development.

However, these are most important characteristics of Biosphere Reserves. Biosphere Reserve is shifting paradigm toward towards the conservation approach wisely and sustainably utilizing the natural resource.
Priority of local community and conflict resolution: It is very important to involve the local communities in management applying the Multi-stakeholder approach. It is essential to find the resolution of conflict on utilization of natural resource through dialogue The role of traditional knowledge in ecosystem management is incorporated

Biodiversity conservation and sustainable use: It is parallel emphasize to protect the protected areas and their surrounding landscape to combine both biodiversity conservation and sustainable/wise use of natural resources. This is very important characteristics of Biosphere Reserve.

Typical area: The Biosphere Reserve should be bigger in size typical area >5000 sq. km.

Focus area: The designation of Biosphere Reserve emphasize on research and education to guide sustainable development practices and policies importantly. The sites of Biosphere Reserves are excellence for education and training.



Physically, each BR has three interrelated zones which aim to achieve the three complementary and mutually reinforcing functions (UNESCO 1996, 2014, 2015):

The core areas comprise a strictly protected ecosystem that contributes to the conservation of landscapes, ecosystems, species and genetic variation.

A clearly identified buffer zone which sur-rounds or adjoins the core areas and is used for activities compatible with sound ecological practices that can reinforce scientific re-search, monitoring, training, and education.

The transition area is the part of the reserve where the higher number of activities is allowed. They may include a variety of agricultural activities, settlements and other uses in which local communities, management agencies; scientists, NGOs, cultural groups, economic interests, and other stakeholders work together fostering economic and human development that is socio-culturally and ecologically sustainable. Despite flexible in scope, transition areas should have a clear outer boundary delimitation through stakeholder consultation and considering natural (e.g., watersheds) and political-administrative boundaries.

Benefits and Opportunities from Biosphere Reserves

Recognitions and awareness: The primordial advantage of designating a site as a BR is that it can raise awareness among local people, citizens, and government authorities on environmental and development issues (UNESCO 2015a). BRs high-light the distinctiveness of the area and help foster a sense of place amongst residents and visitors (Water-ton n/d), also bringing international visibility for the area (Cape Wineland 2019).

Enhanced livelihood and environmental sustainability: BR can serve as pilot sites or “learning places” to explore and demonstrate approaches and policies to conservation and sustainable

development, providing lessons that can be replicated in other places (UNESCO 2015a)and encouraging diverse local economies and the revitalisation of rural areas (Waterton n/d).

Networks, partnerships, and cooperation: BR facilitates the pooling of expertise, knowledge, research, and funding through a network of collaborative work and broad alliances. MAB works together with other UN agencies, international and national partners, different governments, NGOs, academia, and the private sector, and promotes North-South and South-South cooper-ation4 (UNESCO 2015). The WNBR and the different regional, sub-regional or thematic networks are also unique tools for international co-operation through sharing knowledge, exchanging experiences, building capacity and promoting best practices (UNESCO 2015). The MAB Programme also contributes to global efforts for education and capacity-building through work-shops, training courses, educational programmes, prizes and partnerships with professional and educational institutions(UNESCO 2015).And lastly, BRs also attract academic and government research activity.

Funding: BR are tools to raise funds for conservation. They can help to attract additional fund-ing and greater opportunities for development initiatives through the MAB networks and partnerships above mentioned (Cape Wineland 2019). MAB-branding attracts technical support, additional-value to products and services through ecolabeling and certification schemes (Clüsener-Godt 2015) and the BR recognition also attracts more tourists and visitors boosting the creation of jobs in the tourism sector (Cape Wineland 2019). There are also reports that the BR nomina-tion has resulted in increased property values (Cape Wineland 2019).

Stronger Governance and institutional framework: BRs constitute an innovative approach to governance at multiple levels: locally they are a potent tool for social empowerment and planning; nationally they serve as hubs of learning and replication; internationally they provide means of cooperation with other countries, and are also a concrete way of addressing international obli-gations and goals such as the Convention on Biological Diversity, the Paris Climate Agreement, the Aichi Biodiversity Targets and the SDGs (UNESCO 2005, 2015b).

Additionally, many times, the establishment of a BR is followed by strengthened policy and legislation, which result in a stronger institutional and political framework for landscape governance and management.
Conflict management: There are examples where BR act as a fundamental tool and model sites for conflict management resolution. In East Africa, e.g., BRs have triggered the establishment of a more equitable relationship between wildlife conservation and landowners, reducing poaching and increasing economic development through tourism (AWF, 2018).

Biosphere reserve in the world

The concept of biosphere reserve becomes as popular destination for nature conservation considering the man and biosphere interaction. The Biosphere reserves are 'learning places for sustainable development'. Each site promotes solutions reconciling the conservation of biodiversity with its sustainable use. They are learning areas for sustainable development under diverse ecological, social and economic contexts, touching the lives of more than 250 million people.

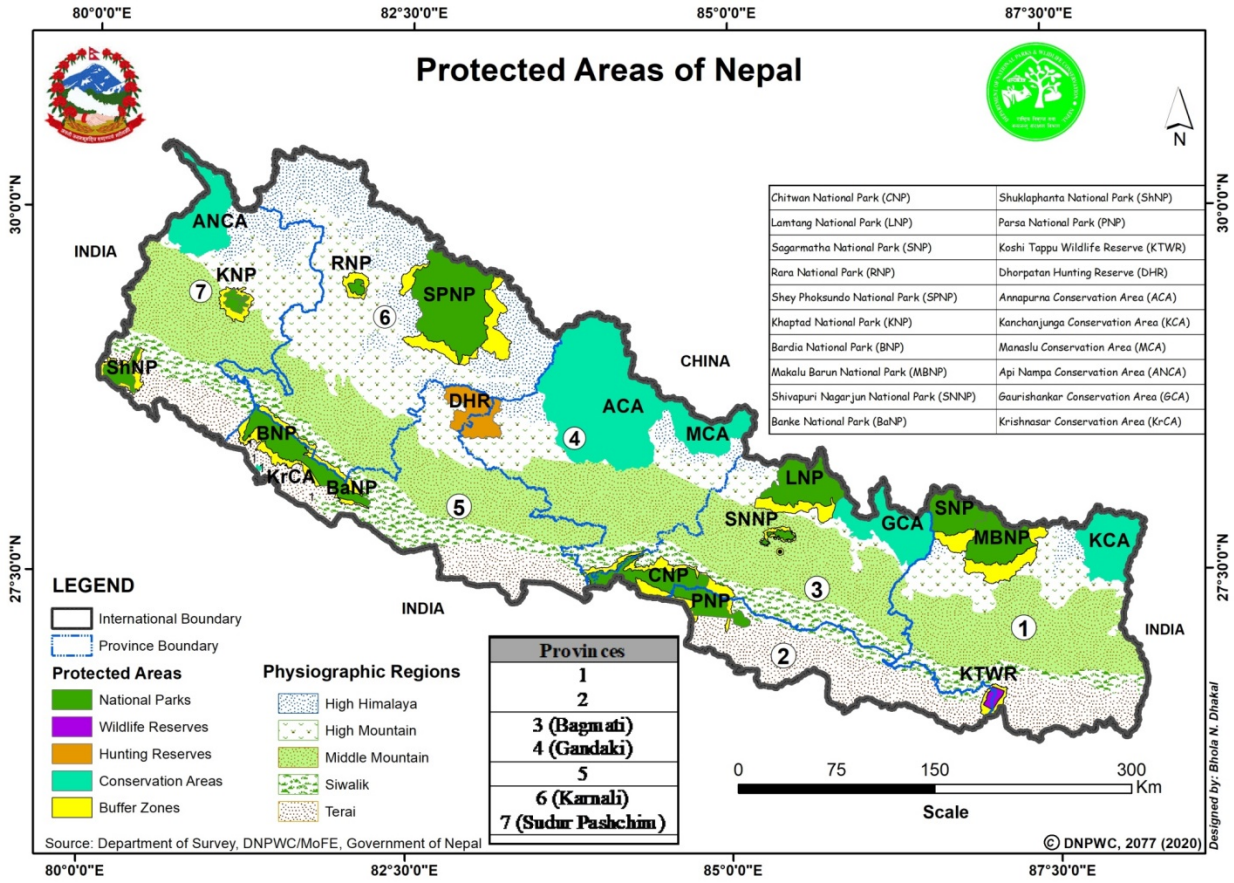
Altogether, there are currently 714 biosphere reserves in 129 countries, including 21 transboundary sites that belong to the World Network of Biosphere Reserves. About 257 million people living in BR, Span area: 6,812,000 square km. Biosphere reserves are nominated by national governments and remain under the sovereign jurisdiction of the states where they are located. The Conference led to

the launching of the UNESCO MAB Programme in 1971. MAB is a part of UNESCO now. It has started a World Network of Biosphere Reserves. The MAB program has built up the World Network of BRs since 1971.

The Asia and the Pacific region counts 4 regional network: out of which Nepal lies in South and Central Asia MAB Network (SACAM) in 2002 comprising 10 countries. These are Afghanistan, Bangladesh, Bhutan, India, Nepal, Iran, Kazakhstan, Maldives, Pakistan and Sri Lanka. There are 18 biosphere reserves in India, 4 each in Bangladesh and Sri Lanka, 3 in Pakistan but there are still nill biosphere reserves in Bhutan, Afghanistan and Nepal. Another neighboring country China set 28 biosphere reserves.

Protected areas in Nepal

There are 20 Protected Areas in Nepal. These are distributed form Terai to High Himalaya. Out of this, there are twelve National Park, one each hunting reserve and wildlife reserve and six conservation area. The National Parks are Chitwan National Park, Shuklaphanta National Park, Langtang National Park, Parsa National Park, Sagarmatha National Park, Rara National Park, Sheypksundo National Park, Khaptad National Park, Bardia National Park, Makalu Barun National Park, Shivapuri Nagarjun National Park and Banke National Park. Koshitapu Wildlife Reserve, Dhorpatan Hunting Reserve, Annapurna Conservation Area, Kanchanjangha Conservation Area, Manaslu Conservation Area, Api Nampa Conservation Area, Gaurishankar Conservation Area and Krishnasar Conservation Area are working to protect the wildlife in Nepal.



Protected Animals and Birds:

Total 26 mammal species are protected under the Wildlife Conservation Act. These are Assamese Monkey**,** Pangolin**,** Hispid Hare, Dolphin **,** Grey Wolf **,** Himalayan Brown Beer **,** Red Panda , Lingsang , Striped Hyena , Leopard Cat **,** Lynx , Clouded Leopard , Tiger , Snow Leopard **,** Wild Elephant , One-horned rhinoceros **,** Pygmy Hog , Musk Deer , Swamp Deer , Gaur **,** Wild Yak , Wild Buffalo **,** Great Tibetan Sheep **,** Tibetan Antelope **,** Black buck and Four-horned Antelope**.** Similarly, Black Stork, White Stork, Sarus Crane, Cheer Pheasant, Impeyon pheasant, Crimson-horned Pheasant, Bengal Florican, Lesser Florican and Giant Hornbill are the protected birds in Nepal. Moreover, Python, Crocodile and Golden Monitor Lizard are the protected reptiles in Nepal.

Man and Biosphere status in Nepal: Man and Biosphere activities have been started in Nepal since 1975. The result is establishment of the International Centre for Integrated Mountain Research, ICIMOD, was established under the MAB programme in Kathmandu in 1983. However, there are big gaps in activities to set a fruitful effort for Man and Biosphere in Nepal. There are immense significance and potential of its natural and cultural patrimony and the many activities already developed. After long gap, in 2014, and again in 2018, the Department of National Park and Wildlife Conservation reinstated the interest in identifying a suitable site for Biosphere Reserves in Nepal. Study has already conducted to assess the potential area of Biosphere Reserve in Nepal. Still, we are in process to lay the final stones necessary to pave the way towards the first Biosphere Reserve nomination in Nepal.

Why Biosphere Reserves in Nepal

The biosphere reserves are able to create a very good opportunity in conservation. The people's participation to conserve the nature and living being is significant because people are major part of nature. Keeping people outside the reserve or protected areas is beyond our imagination and control. Though buffer zone can support to protect the wildlife in the protected area in some level of context, beyond that too people have interest to interact with nature. This is only possible after involving them which is possible through formulation of biosphere reserve. Some important aspects of need of biosphere reserves in Nepal are listed below.

- Biosphere Reserves are important to conserve biodiversity and for human wellbeing
- Biosphere Reserves will be able to attract international attraction for research, conservation and community wellbeing to support SDG
- Biosphere Reserves helps to connect with world network
- Each Biosphere Reserve is a living laboratory for Sustainable Development and a special place to promote an integrated and multi-disciplinary approach towards Sustainable Development based both on local community efforts and sound science evidence.
- Biosphere Reserves are nominated by national governments and remain under the sovereign jurisdiction of the States where they are located, but their status as a BR is internationally recognised.
- The BR-branding is a valuable tool to attract technical support, cooperation and adds value to products & services
- Nepal is establishing the UNESCO village in Yagyadol which is one of identified potential site for Biosphere Reserve

Potential areas of Biosphere Reserve in Nepal

Mainly Five areas are identified to design the Biosphere Reserve in Nepal. These are Kanchenjunga Landscape, Karnali Landscape, Langtang-Shivapuri Landscape, Langtang-Shivapuri Landscape, Annapurna Conservation Area and Kailash Landscape.

CA	Description	Importance
Kanchenjunga Landscape	Comprising, but not limited, to the area of Kangchenjunga CA and following recommendations from Kangchenjunga Landscape Conservation and Development Initiative facilitate by ICIMOD	Nepal & India trans boundary
Karnali Landscape	Comprising Rara NP, Ramaroshan and Sinja valley (Jumla)	China & Nepal Transboundary importance
Langtang-Shivapuri Landscape	Considering Langtang NP and Shivapuri-Nagarjun NP	China & Nepal Transboundary importance
Annapurna CA	Including the CA and its buffer zone	Pokhara valley National importance
Kailash Landscape	Comprising Api Nampa CA, Limi valley and Kanda village	Himalayan & religious importance : Nepal & China trans boundary

Kanchenjunga Landscape: The Kangchenjunga Landscape (KL) is an important trans-boundary landscape in the Hindu Kush Himalaya shared by Bhutan, China, India and Nepal comprising more than 25,000 km2 in the southern part of Mt. Kangchenjunga, representing nine global ecoregions. (Chaudhary et al. 2015), In Nepal, the KL comprises an area of 5,190 km2, covering seven municipalities in Taplejung, Panchthar, Ilam and Jhapa districts. KL is the target of many national and transboundary conserva-tion initiates. Since 2012, the KL region is part of the Kanchenjunga Landscape Conservation and Development Initiative (KLCDI), a collaborative transboundary programme among the governments of Bhutan, India, and Nepal, launched in 2012. Under the initiative, the collaborating partner insti-tutions, with facilitation and support from the ICIMOD, seek to promote sustainable development and biodiversity conservation in the KL. The initiative highlights that most remnant areas with high biological diversity along the region are found in the border areas and face many conservation issues that are transboundary in nature, thus demanding an integrated approach for effective conservation through regional cooperation (Chaudhary et al. 2015). The vegetation of Kanchenjunga is diverse, represented by subtropical evergreen forests in the lower mid-hills to alpine grasslands in the high hills and mountains. The region is also a global hotspot for plant biodi-versity (DNPWC 2019), and botanists have identified twenty-three different species of rhododendrons growing in the area (DNPWC 2019), three of them being endangered – *R. leptocarpum, R. niveum* and *R. sikkimense* (Rana 2008) and 21 species of flowering plants that are endemic to the landscape (MoFSC 2006).

These very diverse and rich ecosystems serves as a habitat for many umbrella, charismatic and threatened species including the Snow leopard (*Panthera uncia*) (VU7), Bengal tiger (*Panthera tigris*) (EN), Red panda. (*Ailurus fulgens*) (EN), Asian elephant (*Elephas maximus*) (EN), and Himalayan musk deer (*Moschus leuco-gaster*) (EN) (DNPWC 2019, ICIMOD 2007, IUCN 2018). Fifteen species of mammals found in the KL are also protected under CITES (ICMOD 2007).

Over 1.4 million people of diverse ethnic groups inhabit the KL. The main groups include Limbu, Rai, Brahmin, and Tamang (MoFSC 2016). The KL holds a rich cultural heritage, and agriculture is the mainstay for the majority of people. People follow mixed farming systems comprising crop production and animal husbandry. However, major livelihood means vary geographically. In the bordering villages like Olangchung Gola, people rely almost exclusively on transboundary trade with Tibet. Likewise, at higher elevation settlements, the contribution of animal husbandry is higher compared to the settlements of lower elevation. In the lower elevation villages, crop production is the major economic activity. Although commercialisation of agriculture is increasing, mainly led by cardamom (*Amomum subulatum*) cultivation, agriculture is mostly of subsistence in nature. Major crops grown are paddy, millet, maize, wheat, buckwheat, rice and potato (Chaudhary et al. 2015).

Langtang-Shivapuri Landscape: In the history of the MAB Programme in Nepal, Langtang NP and Shivapuri Nagarjun NP were considered as possible BR sites. During the consultation with the MAB Committee and the DNPWC for this study, it was agreed to consider a larger potential BR area involving both NP. The area as a whole meets more criteria than separately, and all the two sites were considered together as the Langtang-Shivapuri Landscape area. Tentative boundary delimitation is presented in Figure 21; however, the final boundary definition still needs to be carried, in consultation with local stakeholders. A brief context of each of the three sites is also presented below.

Shivapuri Nagarjun National Park (SNNP) was established in 2002,and it is situated on the northern fringe of Kathmandu valley, in the districts of Kathmandu, Nuwakot, Dhading, and Sindhupalchowk, lying about 12 km away to center of the capital city (DNPWC 2019, SNNP-MP 2016). It is the nearest NP of Kathmandu in the Central Himalayan Region, and it covers an area of 159 km2 with elevation ranging from 1,000 m to 2,732 m (SNNP-MP 2016).

Langtang National Park

Langtang National Park (LNP) was established in 1976 to conserve the unique flora and fauna of the region. It is the second nearest NP of the capital Kathmandu in the Central Himalayan Region. The 1,710 km2 of the park extends over parts of Nuwakot, Rasuwa, and Sindhupalchok districts in the southern mountainous terrain of the Nepal-China (Tibet) border (DNPWC 2019, LNP 2014).

Sub-tropical vegetation characterised by Sal (*Shorea robusta*) for-est in the southern section of the park is grad-ually taken over by hill forest (2000-2600m) consisting of Chirpine (*Pinus roxburghii*), Rhododendron, and Nepalese alder (*Alnus nepalensis*). The temperate zone (2600-3000m) is covered mainly by Oak forest fading to old growth forest of Silver fir, Hemlock, and Larch in the lower sub-alpine zone (3000-3600m). The Nepalese larch (*Larix nepalensis*), the only deciduous conifer in the region, is found in this park and few places elsewhere. Throughout these zones, different species of Rhododendron such as *R. arboretum*, *R. barbatum*, *R. campanulatum*, and R. *lepidotum*, form a colourful understory. Tree species such as Birch, Silver fir, and twisted *R. campanulatum* are found near the tree line. It is here at 4,000m that Juniper and Rhododendron shrubs (*R. anthopogon)* slowly dissolve into expansive alpine grassland meadows.

Areas expansive high meadows and forests provide habitat for numerous mammal species.46 have been recorded in the park; the Assamese monkey (*Macaca assamensis*) (NT), Red panda (EN), Clouded leopard (*Neofelis nebulosa*) (VU), Common leopard (*Panthera pardus*) (VU), Snow leopard (VU), Himalayan muskdeer (EN), Asiatic black bear (*Ursus thibetanus*) (VU), and Himalayan tahr (*Hemitragus jemlahicus*) (NT) among them. The occurrence of the Dhole or wild dog (*Cuon alpinus*) (EN) and Grey wolf (*Canis lupus*) (LC) is still nebulous (LNP-MP 2014). Also, more than 250

species of birds are found in LNP, twelve of them globally threatened (LNP 2014, LNP-MP 2014). The Himalayan Monal (*Lophophorus impejanus*) (LC), the national bird of Nepal also known as Danphe, and Satyr tragopan (*Tragopan satyra*) (NT) are protected birds found in the park (LNP-MP 2014, IUCN 2018).

Diverse community of Kathmandu Valley, Tamang, Brahman and Chetry communities are living in this proposed Biospher Reserve. Three district specifically some parts of Nuwakot and Rashuwa and Kathmandu will be boundary of this Biosphere Reserve.

Annapurna Conservation Area: The Annapurna Conservation Area (ACA) with 7,629 km^2 is the largest PA in Nepal. Managed by an autonomous non-governmental organisation the NTNC (Baral et al. 2008). It is located in the Mustang district, bordering the China and close to Manaslu Conservation Area (Gurung et al. 2014). NTNC - and it was a pioneering initiative in the country, aiming maximum participation and management by local people (UNESCO 2010, Hough & Sherpa 1989). ACA is the first initiative in the history of conservation in Nepal where local communities were directly involved in the management of the protected area. Finally, in 1992, the area was formally gazetted as ACA (UNESCO 2010).

Karnali Landscape: The Karnali River is the longest river in Nepal (507 km), it originates near Mansarovar and Rokas lakes in the TAR of China and flows southwards to con-fluence with the Seti River - draining the west-ern area of the catchment (202 km) - and the Bheri River (268 km) - draining the eastern catchment. The smaller Mugu, Humla, Jumla, Tila, and Sinja rivers join the Karnali as it flows south through this remote terrain. The Karnali River finally enters the Terai as two branches, the Geruwa in the east and Kauralia Karnali in the west. The Karnali Conservation Landscape (KCL), proposed by the GoN in 2016, coincides with the whole Karnali river basin, covering an area of 31,471.42 km2 in 18 districts.

Rara National Park: Rara National Park (RNP) and its BZ are located at the north-western high mountains of Nepal. Rara was gazetted in 1976 to conserve the unique beauty of Lake Rara, and to protect the representative flora and fauna of the Humla-Jumla region. The park is Nepal's smallest PA, comprising an area of 106 km2with ele-vations ranging from 2,754 to 4,097 m (DNPWC 2019). The park con-tains mainly coniferous forests and the area around the lake is dominated by Blue pine up to 3200 m. Other tree species include *Rhododen-dron arboreum*, Black juniper (*Juniperus indica*), West Himalayan spruce (*Picea smithina*), Oaks, and Himalayan cypress (*Cupressus torulosa*). A mixed forest of Pine, Spruce, and Fir occurs from 3,200 to 3,550 m. At about 3,350 m, the forest changes to a coniferous-broadleaf forest of Fir, Oak, and Birch. Other deciduous tree species include Indian horse-chestnut (*Aesculus indica*), Walnut (*Juglans regia*), and Himalayan poplar (*Populus ciliata*) (Sharma et al. 2013). Some endemic plants found along Rara Lake, including Karnali river catchments, are *Nirbishi kyasar*, *Primula poluninii*, and *Cirsium flavisquamatum*. Tee radiant blue waters of the lake are home to the frog Rara paha (*Paa rarica*) which is found at only one other location in the Central region, and three endemic species of snow trout Asala macha (*Schizothorax macropthalus, S. nepalensis, and S. raraensis*) (Ramsar 2007, DNPWC 2019, Upadhaya et al. 2009). Smooth otter (*Lutra perspicillata*) is also a well-represented mammal in the lake. During winter, Rara is the destination of migratory birds; of the 235 bird species recorded, 49 species use this area as their resting site during migration (DNPWC 2019, Upadhaya et al. 2009). Additionally, four endangered and vulnerable fauna have been recorded within the park: Himalayan muskdeer (EN), Wood snipe (*Gallinago nemoricola*) (VU), Red panda (EN) and Cheer pheasant (*Catreus wallichii)*

(VU) (Upadhaya et al. 2009, IUCN 2018). The Park is also considered an Important Bird and Biodiversity Area (IBA) based on its exquisite highland bird diversity (MoFSC 206).

Kailash Sacred Landscape (KSL): This comprises a vast region that includes remote areas of the TAR of China and adjacent portions of Nepal and In-dia. It is a region historically, ecologi-cally, and culturally interconnected (Zomer and Oli 2011). In Nepal, the Kailash Landscape area extends for about 13,289 km2 and comprises the districts of Baitadi, Bajhang, Darchula, and Humla. The altitudinal gradient ranges from 518 to 7,132 m, and major rivers in this region include the Humla, Karnali, Mahakali, and Seti rivers. 24% of the total land area is covered by forests, which are particularly rich in biodiversity. The region lies at the intersection of three major floristic regions; namely, the Western Himalayan, Eastern Himalayan, and Central Asiatic. The vegetation ranges from sub-tropical broadleaf forest, subtropical pine forest, and subalpine conifer forest to alpine shrubs and mead-ows (Zomer and Oli 2011). In the district of Baitadi, there are also two PF - Gwalec and Sigas – and in Surkhet another one forest called Kakiebihar (MoFSC 2016a).

Api Nampa Conservation Area : The Api Nampa Conservation Area (ANCA) is a PA area in the far-western, Nepal. It was established in 2010 and covers 1,903 km2 in the Darchula District. The western boundary is formed by the Maha-kali River, the northern by the international border with Tibet-China, and adjacent to the east is the Bajhang and Baitadi districts (Sap-kota 2018).
The current assessment of the ANCA's biodiversity revealed one endemic plant species, *Delphinium hima-laya Munz*, and two endemic species of snails, *Vallonia costohimala* and *Vallonia himalaevis*. Two plant species are also globally threatened: *Nardostachys grandiflora* (CR), and *Taxus contorta* (E); while ten floral species are nationally protected under various categories.

Among the faunal species, ANCA is home to many globally and nationally species of mammals such as Snow leopard (VU) and Himalayan muskdeer (EN). Other ecologically important mammal species recorded in ANCA are Asiatic black bear (VU), Common leopard (VU), Grey wolf (LC), Golden jackal (LC), Blue sheep (LC), Nepal Gray langur (LC), Porcupine (*Hystrix indica*) (LC), Himalayan tahr (NT), and Sumatran Serow (VU) (ANCA-MP 2012, IUCN 2018). The CA also provides habitats for many birds including Nepal's national bird Himalayan Monal, also known as Danphe (LC), Cheer pheasants (VU), Blood pheasant (LC), Red-billed chough (LC), and Yellow-billed chough (LC) (ANCA-MP 2012, IUCN 2018).

Way forward

Three important steps are required to designate the Biopshere Reserve in Nepal. These are the
i. Policy level requirement,
ii. Financial support to detail study for Biosphere Reserve and
iii. International cooperation

i. Policy requirement: Nepal has been implementing the National Park and Conservation Act 1973. Based on this, total 20 protected areas are working under the government of Nepal. These protected areas are 12 national park, one wildlife reserve, one hunting reserve and six conservation areas. These conservation areas are designed to protect the wild animals. The sustainable development goal agenda 21 emphasize on the sustainable and wise utilization of natural resource which needs to design the Biosphere Reserve. There is no provision of design the Biosphere Reserve in present act. Thus, the act needs amend in support of design the Biosphere reserve in Nepal based on the study done in the initiation of Department of National Park and Wild Life Reserve.

ii. Detail study for Biosphere Reserve: The study done in 2014 and 2018 focused on the feasibility of the Biosphere Reserve. The site of Biosphere Reserve has been identified but its detail study has not so far done. It may be because of the limitation of financial support. This is another important needs to design the Biosphere Reserve in Nepal.

iii. International cooperation: Proposed Biosphere Reserves touch the international boundary of India and China. Specifically, proposed Karnali Landscape, Kailash Landscape and Langtang-Shivpuri Landscape can touch the boundary of China while can KanchanJungha Landscape can touch the international boundary of India. So, international transboundary cooperation is needed to design the Biosphere Reserve in Nepal.