Ministry of Forests and Soil Conservation
Department of National Parks and Wildlife Conservation
Babarmahal, Kathmandu, Nepal

# An Assessment of Protected Areas Contribution on National Economy and Environmental Conservation in Nepal .

Prepared by


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**Produced for:** Government of Nepal, Ministry of Forests and Soil Conservation
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**Produced by:** Research and Development Center (RDC)-Nepal, Anamnagar, Kathmandu
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# EXECUTIVE SUMMARY

*This study was undertaken with the purpose of assessing the contribution of the economic value of goods and services provided by the protected areas (PAs) to the national economy and environmental conservation in Nepal. Accordingly, the study recognized the goods and services produced from the PAs and assessed the environmental status of bio-diversity in the PAs. These tangible and intangible goods and services were valued in monetary units to obtain the total economic value of the PAs. The national income accounting system in Nepal follows the international standard procedure which classifies the total economic activities into 15 categories of industry division. Among these 15 categories, 4 categories namely agriculture and forestry; fishing; mining and quarrying; electricity, gas and water; hotel and restaurants; and transportation sector are related to the PAs. Two categories-fishing and mining and quarrying were economically insignificant and were combined with other sector. Accordingly, this study estimated the contribution of the PAs to these four categories.*

*The study used both primary and secondary sources of data. The secondary sources comprised of the reports of Department of National Parks and Wildlife Conservation, offices of various PAs, the National Trust for Nature Conservation, and Nepal Electricity Authority among others. Primary data was collected from five national parks (NP), one wildlife reserve (WR) and one conservation area (CA) out of a total of 20 PAs in Nepal. The primary data was collected through a rapid assessment approach. Accordingly, data were collected from relevant key informants through focus group discussions using semi-structured questionnaire. The relevant data were collected at different organizational levels such as the mangers of PAs, the local communities of the PAs, and the buffer zones. Environmental data were gathered from ecologists and managers of the PAs.*

*The total value of goods and services produced by PAs were categorized into provisioning services, cultural services, regulating services and supporting services. Provisioning services included the value of timber, firewood, non-timber forest products such as medicinal and aromatic plant, construction materials etc. Cultural services consisted of income from entry fees, expenditure made by tourists in hotels, restaurants and other tourism related activities. Regulating services comprised of value of the flow of services in the form of drinking water, hydroelectricity production, carbon sequestration and bio diversity value measured in terms of foreign grants and program activities conducted by external agencies. Supporting services consisted of value addition by ecosystem services measured in terms of contribution to agriculture and livestock income.*

*The total economic values of the seven sampled PAs revealed that Chitwan NP generated the highest total economic value (NRs. 16,093 million) followed by Annapurna CA (NRs. 4,934 million) and Langtang NP (NRs. 4,375 million). The lowest total economic value was found for Rara NP (NRs. 222 million) followed by Bardia NP (NRs.1,671 million), Koshi-Tappu WR (NRs. 1,693 million and Shivapuri Nagarjun NP (NRs. 3,929million).*

*In terms of value per unit area, Shivapuri Nagarjun NP had the highest total economic value of NRs. 142 thousand per hectare followed by Chitwan NP (NRs 96 thousand), and Koshi Tappu WR (NRs.49 thousand). The smallest total economic value per hectare was obtained*

*for Annapurna CA (NRs 6.5 thousand), Rara NP (NRs. 7.3 thousand), Bardia NP (NRs 11.3 thousand), and Langtang (NRs 20.5 thousand) National Park.*

*Using the system of national accounts, the study estimated that goods and services produced by PAs contributed 2.3 percent of the gross domestic product (GDP). Among the classification by industrial sectors, the agriculture and forestry sector contributed 1.94 percent while hotel and restaurant sector contributed 0.25 percent. Transport, storage and communications contributed 0.09 percent while electricity, gas and water contributed 0.01 percent of GDP. If the country received carbon payment, PAs will make an additional 0.02 percent contribution to GDP. For comparison, PAs of the United States of America is estimated to generate about $ 62 billion in 2016. In terms of US total GDP, this value is equivalent to about 0.32 percent*

*There is a scope of increasing the contribution of PAs in Nepal through improved tourism sector performance, better utilization of water resources for hydroelectricity generation without adversely affecting bio-diversity, transforming traditional crops into high value crops less damaged by wildlife in the buffer-zone, among others.*

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# ABBREVIATIONS/ACRONYMS

| | |
|---|---|
| BCN | Bird Conservation Nepal |
| BZMC | Buffer Zone Management Council |
| BNP | Bardia National Park |
| BZ | Buffer Zone |
| BZMG | Buffer Zone Management Group |
| CA | Conservation Area |
| CBD | Convention on Biodiversity |
| CBO | Community Based Organization |
| CBS | Central Bureau of Statistics |
| CFUG | Community Forest User Group |
| CVM | Contingent Valuation Method |
| DDC | District Development Committee |
| DFO | District Forest Office |
| DNPWC | Department of National Park and Wildlife Conservation |
| ESVD | Ecosystem Services Value Database |
| FGD | Focus Group Discussion |
| GIS | Geographic Information System |
| GON | Government of Nepal |
| Ha | Hectare |
| HR | Hunting Reserve |
| I/NGO | International/Non-Governmental Organization |
| IUCN | International Union for Conservation of Nature |
| KTWR | Koshi-Tappu Wildlife Reserve |
| KUKL | Kathmandu Upatyaka Khanepani Limited |
| MAB | Man and the Biosphere |
| MEA | Millennium Ecosystem Assessment |
| MFSC | Ministry of Forest and Soil Conservation |
| NEA | Nepal Electricity Authority |
| NP | National Park |
| NPS | National Park Service |
| NPWCA | National Park and Wildlife Conservation Act |
| NRs | Nepalese Rupees |
| NTB | Nepal Tourism Board |
| NTFP | Non-Timber Forest Products |
| NTNC | National Trust for Nature Conservation |
| OECD | Organization for Economic Co-operation and Development |
| PA | Protected Area |
| PHQ | Park Headquarter |
| PPP | Purchasing Power Parity |
| RAND | Research and Development |
| CNP | Chitwan National Park |
| RIMC | Rural Infrastructure and Management Consultant |

| | |
|---|---|
| SNA | System of National Accounting |
| TEEB | The Economics of Ecosystems and Biodiversity |
| TEV | Total Economic Value |
| UN | United Nations |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| US | United States |
| WCPA | World Commission of Protected Areas |
| WHC | The World Heritage |
| WR | Wildlife Reserve |
| WTA | Willingness to Accept |
| WTP | Willingness to Pay |
| WWF | World Wildlife Fund |
| ZSL | Zoological Society of London |

# SECTION ONE: INTRODUCTION

## 1.1 Background

A Protected Area (PA) is "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN, 1994). PAs are natural capitals and harbor various ecosystems and/or heritage sites. They are also the most important sites in order to achieve conservation goals, and play significant role in the conservation, sustainable and equitable use of biodiversity. They also serve as destinations for scientific research, wilderness protection, maintenance of environmental services, education, tourism and recreation, protection of specific natural and cultural features, and sustainable use of biological resources.

PAs are seen as the key strategy for biodiversity and nature conservation worldwide. Over 209,000 PAs of different sizes and categories exist globally, from more than 193 countries and territories. Aichi biodiversity target 11 of the Convention on Biological Diversity envisions that by 2020 at least 17 per cent of the terrestrial and inland, and 10 per cent coastal and marine areas will be protected (CBD, 2010). Among countries, there is a great variation in terms of PA coverage. Increasing number of PAs at the global level can be attributed to the lobbying and conservation advocacy by the global and/or regional conservation organizations. Nepal has established different categories of PAs and cover 23.39 percent of its land area (DNPWC, 2017).

The importance of PAs has been highlighted by international conventions and programs such as the Convention on Biodiversity (CBD), the World Heritage Convention (WHC), the Ramsar Convention on Wetlands, the UN Law of the Sea Convention, Man and the Biosphere (MAB) Program of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the global program of World Commission on Protected Areas (WCPA). Together these conventions and agreements are the backbone of international policy on the establishment and management of protected areas for biodiversity conservation and the sustainable use of natural and cultural resources (Phillips, 1998).

As the conventional funding for the conservation and management of PAs are becoming increasing scarce, alternative financing mechanism are being innovated to complement the traditional funding. Since, the PAs provide multiple benefits including the passive services, a comprehensive assessment of the goods and services both tangible and intangible emanating from natural capital including that from the PAs was considered necessary. Hence, a seminal paper by Robert Costanza (1997), attempted to identify various benefits (such as water) and services (recreation) that the humans directly or indirectly enjoy from ecosystem functions. In 2003, the Millennium Ecosystem Assessment (MEA, 2003) suggested a simple typology to summarize the various services from natural ecosystems. This typology considers four types of ecosystem services emanating from any natural capital including that from PAs. They are:

- Provisional Services: ecosystem's ability to provide natural resources such as food, timber, medicinal plants etc
- Regulating Services: ecosystem's regulatory process such as climate regulation, water and water flow regulation, erosion control and fertility maintenance
- Recreational/Cultural Services: ecosystem's non-material benefits such as recreation and tourism, information for research and education etc.
- Supporting Services: Ecosystem maintenance (soil formation), biodiversity conservation etc.

As a follow up to the MEA, The Economics of Ecosystems and Biodiversity (TEEB) has proposed various methodologies and tools to carry out the economic valuation of these four categories of ecosystem services. The TEEB study is a major international initiative to draw attention to the global economic benefits of biodiversity, to highlight the growing costs of biodiversity loss and ecosystem degradation, and to draw together expertise from the fields of science, economics and policy to enable practical actions moving forward ((TEEB, 2010; Ring et al. 2009). TEEB seeks to show that economics can be a powerful instrument in biodiversity policy, both by supporting decision processes and by forging discourses between science, economics and governing structures. The legitimate and effective use of economic instruments in biodiversity conservation depends on applying and interpreting them appropriately, taking into account the ecological, economic and political challenges associated with valuing biodiversity and nature's services to society.

The integrated study of ecology and economy provides the foundation for assessing the economic contribution of PAs in the national economy of Nepal. One of the important objectives of economic valuation is to improve the function of public policy on PAs or to help in making resource allocation decision on PAs. Economics provides a framework to estimate the values of these multiple ecological services from the perspective of human being. They, thus, refer to instrumental value and not the intrinsic value inherent in a particular ecosystem benefits. Moreover, although PAs provide both intermediate and final ecological services, economic valuation consists of only final ecological services. From the theoretical perspectives, there are basically two main approaches of economic valuation of ecosystem services. They are (a) valuation based on revealed preference method, and (b) stated preference method. There are further sub-categories of these two methods. Revealed preference method depends upon the willingness to pay as revealed by the consumer, and it can be observed by outsiders as well. One of the simple examples of revealed preference method is the market price method. Since some of the ecosystem services such as the value of a tiger in the national park cannot be measured through revealed preference method, researchers have to ask the participants or the potential observers to state her/his willingness to pay to value the tiger in the wild. This method of valuation technique is further categorized into Contingent valuation and its variations, and Delphi technique of valuation.

## 1.2 The context in Nepal

The unique geographical position and variation in altitude and climate have led Nepal to have about 118 ecosystems within an area of 14.7 million hectares (Ha). Among these ecosystems,

80 national ecosystems are included in the PAs of Nepal (DNPWC, 2017). This has made Nepal one of the most important storehouses of ecological, species and genetic resources in the world. It is a home to diverse floral and faunal species spreading from lowland sub-tropical region to the ice-capped high Himalayas.

The Department of National Parks and Wildlife Conservation (DNPWC) under the Ministry of Forests and Soil Conservation (MFSC) is the second largest public land management government organization in Nepal, and is responsible for the overall management of these PAs in Nepal. The Department was established in 1979 with the major objective of protecting and conserving wildlife, historical and cultural sites in large landscapes, and their habitats and ecosystems. These PAs cover 3.4 million ha of Nepal. This is equivalent to 23.39 percent of the total area of Nepal. PAs are the major destination of tourists. It is estimated that about 60 percent of the international tourists coming to Nepal visit the PAs. PAs cover 12 NPs, one Hunting Reserve, one wildlife Reserve, six Conservation Areas, and 13 Buffer Zones (BZs) around these NP and Reserves. Around one million people residing within the BZs are entitled to receive 30 to 50 percent of the income of the NPs and Reserves. The government of Nepal generates revenue of about Nepalese Rupees (NRs) 0.5 billion per year from these PAs, mainly from the entry fee of tourist. About 1,900 staffs are employed by the Department to oversee the conservation of these PAs (DNPWC, 2017).

The Protected Area management system formally began in 1973 with the enactment of the National Parks and Wildlife Conservation Act (NPWCA), 1973. Since then, the area and number of PAs have successively increased over the last 45 years. Many donors and international conservation organizations are also supporting the government both to increase and to conserve the biodiversity in Nepal. A total of 12 regulations have been formulated under the Act (1973) to cater to the needs of these PAs scattered over different ecological zones (Terai, Hills and Mountains) of Nepal. As the areas of PAs have increased over time, the park –people conflict has also increased. The government has, therefore, implemented a directive on compensation to the loss of life and property due to wild life in 2012. As per the directive, the government provides relief or compensation on the five categories of losses: human loss, livestock loss, stored food grain loss, loss of house or livestock shed, and crop damage (DNPWC, 2017).

The vision of the Department is to sustainably conserve the major representative ecosystems of Nepal through participatory management. The mission of the Department is to contribute to the national prosperity by conserving the natural resources and biodiversity through contributing to the livelihood rural people through ecotourism.

The major objectives of the Department are to

- Conserve the various ecosystems located in different geographical areas of Nepal,
- Conserve the threatened, rare, and important fauna and flora including bio-diversity,
- Carry out research and studies in order to conserve and manage the fauna, flora and their habitats,
- Protect the unique and beautiful landscapes, wetlands, greeneries, mountains, Himalaya, trekking routes, and important hotspots,

- Contribute to the conservation of traditional customs, and culture of communities residing in and around PAs, and
- Carry out conservation and community development programs with the meaningful participation of local residents through Buffer Zone management programs.

The management of PAs has gone through several major phases since its inception in 1970s from species conservation to ecosystem, integrated conservation and development, and landscape conservation at eco-regional levels. Nepal has progressively marched from conservation policies away from 'people exclusionary' and 'species focused' towards 'people-centered and community based' approaches. Buffer Zone management, and the establishment and operation of Buffer Zone Management Groups (BZMGs) have enabled local people's livelihoods to benefit from PAs as well as biodiversity conservation. Communities, local level authorities, and civil society organizations are now directly involved in supporting PA management and associated livelihood programs. The private sector is also involved through the establishment of tourist facilities.

## 1.3 Objectives of the Study

The overall objective of the study is to assess the contribution of the economic value of goods and services provided by the PAs to the national economy and environmental conservation in Nepal.

The specific objectives of the study are two namely

- to recognize the good and services produced from protected areas that contribute to the national economy and environmental conservation;
- to assess and estimate protected areas' contribution in national economy by considering both tangible and intangible benefits

The first objective is basically to identify and estimate the types and magnitude of goods and services provided by the PAs of Nepal. The second objective is to estimate the economic value of these goods or services in terms of their contribution to the national economy of Nepal. These goods and services can also be lumped together as ecological services as per the definition of MEA and TEEB.

## 1.4 Organization of the Report

This report is organized into five sections. After the introductory section, the second part of the report is devoted to the review of the international literature and literature on PAs of Nepal. The third section deals with the methodology of the study. It also includes literature survey relating to the economic valuation of some of the PAs of Nepal and beyond. The fourth section provides data presentation and analysis. The final section presents the summary and conclusion from the study and recommendation for future activities.

# SECTION TWO: LITERATURE REVIEW

The literature on the economic valuation of ecosystem and environment in general and ecosystem services from PAs is vast and increasing significantly over time. Economic valuation provides opportunity to put monetary values to the beneficial services of PAs and hence compare it with the values generated from other sectors of a country. However, there are still some methodological difficulties in capturing the values of PAs in terms of money matrix. Polasky et al. (2009) elaborate both the opportunities for and the challenges associated with integrating economics and ecology in the study of ecosystem services. They distinguish between integration in positive versus normative analysis. There is a rapid growth in positive research that combines the two disciplines to provide insight and better understanding of the bi-directional linkage between economic and ecological systems. The integration between these two disciplines is equally important, but potentially much more difficult, in normative analysis, especially when interdisciplinary groups include individuals with different views regarding appropriate normative criteria. In such cases, reaching consensus can be difficult and slow, even when the practical implications of the different perspectives (i.e., the general policy prescriptions they imply) are the same. Therefore, there is a need to integrate these two approaches for increasing the scope for collaboration among economists and ecologists in normative analysis.

We reviewed 24 published articles (including the two just discussed above) on the economic valuation of various ecosystem services relevant to this study. Out of these 24 publications, eleven articles are on Nepal's PAs. We reviewed some major empirical paper on economic valuation of ecosystem services at global level and highlighted their conclusions, but present the findings of nine relevant papers on Nepal.

**Global Cases**

The latest comprehensive study on the economic value of nature and global ecosystems was carried out by Costanza et al in 2014. As per the previous study (Costanza, 1997), the global value of ecosystem services was estimated to average US $ 33 trillion per year in 1995 (US $ 46 trillion per year in 2007). In their 2014 paper (Costanza et al, 2014), they provide an updated estimate based on unit ecosystem service values and land use changes between 1997 and 2011. They also address some of the critiques of the 1997 paper. Using the same methods as in the 1997 paper but with updated data, the estimate for the total global ecosystem services in 2011 was US $125 trillion per year (assuming updated unit values and changes to biome areas) and US $145 trillion per year (assuming only unit values changed), both in 2007 US dollar. They, thus, estimated the loss of eco-system services from 1997 to 2011 due to land use change at US $ 4.3–20.2 trillion per year, depending on which unit values are used. Global estimates expressed in monetary accounting units, such as this, are useful to highlight the magnitude of ecosystem services, but have no specific decision-making context. However, the underlying data and models can be applied at multiple scales to assess changes resulting from various scenarios and policies. They emphasize that valuation of ecosystem services (in whatever units) is not the same as co modification or privatization of these services. Many eco-services are best considered as public goods or common pool resources,

so conventional markets are often not the best institutional frameworks to manage them. However, these services must be valued and taken in account for trade off in decision making.

De Groot et al. (2012) provides the most extensive empirical analysis of the economic value of ecosystem services based on a meta-analysis of 300 case studies worldwide ranging from open ocean, coral reefs, coastal system, coastal islands, inland wetlands, lakes, tropical forests, temperate forests to grasslands. Based on the Ecosystem Services Value Database (ESVD) the estimates were converted into the 2007 prices at international Purchasing Power Parity (PPP) dollars per hectare per year to make them comparable across countries. These values provide a general estimate of the value of the ecosystems of different category and serve as a reference when specific empirical studies are not yet available. Many of the regulating and support system components are however intermediate inputs in ecosystem based production function such as timber and NTFP collection and processing, and agriculture including livestock sector. Inclusions of these values are thus likely to create overvaluation of their contribution in the conventional national accounts system. These components would, however, be valuable in examining the contribution of ecosystem services when countries are able to prepare their environmental accounting.

A study by Guo et al. (2001) provided an analytic tool and estimated the value of the ecosystem services by using GIS based information, simulations and evaluation techniques. The study estimated the contributions of ecosystem services of indirect services particularly that of hydrological flow regulation, water retention and storage; and protection of soil fertility among others. Economic valuation of the contribution of protected area ecosystem on hydroelectricity generation in the downstream area is a critical domain in which knowledge gap exists. This study conducted in Xingshan County of China with similar rainfall pattern as that of Nepal has shown the recharge of water by the rivers systems during the five wet (season) months. This was then discharged leading to increased water flow by 14.75 percent during the dry months (December-April). The increased flow led to 0.0175 percent increase in energy production from the installed capacity of the hydropower plants. This approach of estimating the additional energy production due to the present of PA upstream is also used in this study.

Pieter et al. (2002) carried out an economic evaluation of a national park in Indonesia. The Leuser Ecosystem in Northern Sumatra is officially protected by its status as an Indonesian national park. Nevertheless, it remains under severe threat of deforestation. Rainforest destruction has already caused a decline in ecological functions and services. Besides, it is affecting numerous economic activities in and around the Leuser National Park. The objectives of this study were twofold: firstly, to determine the total economic value (TEV) of the Leuser Ecosystem through a systems dynamic model. And secondly, to evaluate the economic consequences of deforestation versus conservation, disaggregating the economic value for the main stakeholders and regions involved. Using a dynamic simulation model, economic valuation was applied to evaluate the TEV of the Leuser National Park over the period 2000–2030. Three scenarios were considered: ‘conservation’, ‘deforestation’ and, ‘selective use’. The results were presented in terms of (1) the type of benefits, (2) the

allocation of these benefits among stakeholders, and (3) the regional distribution of benefits. The economic benefits considered include: water supply, fisheries, flood and drought prevention, agriculture and plantations, hydro-electricity, tourism, biodiversity, carbon sequestration, fire prevention, non-timber forest products, and timber. The stakeholders include: local community members, the local government, the logging and plantation industry, the national government, and the international community. The regions considered cover the 11 districts involved in the management of the Leuser Ecosystem. With a 4% discount rate, the accumulated TEV for the ecosystem over the 30-year period was estimated to be US $ 7.0 billion under the 'deforestation scenario', US $ 9.5 billion under the 'conservation scenario', and US $ 9.1 billion under the 'selective utilization scenario'. The main contributors in the conservation and selective use scenarios were water supply, flood prevention, tourism and agriculture. Timber revenues played an important role in the deforestation scenario. Compared to deforestation, conservation of the Leuser Ecosystem benefits all categories of stakeholders, except for the elite logging and plantation industry.

In yet another study, Strand et al. (2007) used Delphi technique to estimate the willingness to pay for the conservation of Amazon forest. This is the only recent study we could find on valuation by applying the Delphi technique. The Delphi method was developed by the RAND Corporation during the 1950s and 60s. It has a long background and tradition as a management decision tool. The key elements of the method are: (a) anonymous responses by experts to multiple rounds of formal questionnaires; (b) an exercise incorporating iterative, controlled feedback with respect to the information provided at each round; and (c) statistical summary of the group's responses. The approach is designed to minimize the influence of dominant individuals, group pressure, and irrelevant communication and to reduce (statistical) noise.

By the early 1970s, hundreds of studies had appeared from around the world with respect to the need for conserving Amazon. These studies, according to the almost 220 (overall, very highly qualified) international environmental valuation experts who participated in this study, shows that there is considerable amount of WTP among the global population outside of Latin America to avoid further forest losses in the Amazon region. Focusing on experts' predictions in Round 2 of the study for the more comprehensive rainforest protection plan, mean annual WTP per household varied from a high near US $100 in Canada, Norway, and Germany, to intermediate levels closer to US $ 50 in a broader set of OECD countries, to lower levels varying from US $ 4 to US $ 35 for Asian countries.

Haefle et al. (2016) updated the passive use value of National Park System of the US. The National Park Service (NPS) is an agency of the U.S. Department of the Interior founded in 1916. It oversees the system of National Park lands (national parks, national monuments, national recreation areas, national historic sites, and other units (hereafter National Parks), as well as numerous programs both within the parks and in communities throughout the country. The authors presented the first-ever estimate of the total economic value of the entire National Park system (NPS) and NPS programs, including both direct and passive use values. Direct use values derive from on-site use, whereas passive use values are independent of on-site use. In each case they use survey data to calculate "net economic values"—how much

people would pay over and above what they currently spend in order to enjoy National Parks and NPS programs. For non-visitors, these net economic values reflect the entire benefit. The authors estimated the total economic value of NPs and their programs to the American public to be US $ 92 billion. Two-thirds of this total (US $ 62 billion) was estimated to be for National Park lands, waters and historic sites; the remaining US $ 30 billion was attributed to NPS Programs. The estimate, which is based on very conservative assumptions, included not only the value attributed by visitors to the parks, but also a significant "non-use" or "existence" value. This is the value derived by the public from simply knowing that NPS assets are protected for current and future generations, regardless of whether or not they actually choose to visit.

Verma at al. (2017) attempted to estimate the total ecosystem services from the six Tiger Reserves of India in 2014. The authors identified 25 types of services from these six Tiger Reserves. The estimated economic values for various ecosystem services at each of the selected tiger reserve are listed in the paper. The findings indicated that the monetary value of flow benefits emanating from these selected tiger reserves ranged from 128 to 271 million US dollars annually. In terms of unit area, these figures translated into 862 to 2,923 US dollar per hectare per year. In addition, selected tiger reserves protect and conserve stocks valued in the range of US $ 344 million to US $ 10.08 billion.

**Nepal's Case Studies**

Steffen et al. (2006) present the findings of an in-depth study of the importance of natural resources to the livelihoods of 18 households in Chitwan district. One village was located inside Royal Chitwan National Park (RCNP) with no realistic alternatives to Park resources, while the other was located in the buffer zone with equal distance to the Park, a national forest and their community forest. For each household, the collection of products, allocation of time, and purchase and sale of goods were recorded daily through 12 consecutive months and economic values were calculated on the basis of local market prices and recorded quantities. The study shows that products from RCNP are of great importance to the livelihoods of local people. Furthermore, it was found that products collected from the national forest substituted products from the NP, while the substitution effect of the community forest is small. Accordingly, the study illustrates that irrespective of buffer zone community forestry, there is still a gap between local people's need for supplementing natural resources and their rights to satisfy them on a legal basis, which is likely to be unsustainable in the longer term. This calls for a thorough evaluation of actual park-people relations and how these may be improved through local participation that goes beyond the current form of buffer zone community forestry and the admitted 7–14 annual days of open access grass cutting within the park.

Shrestha et al. (2007) estimated the compensation required by the local communities to forego access to the natural resources within the Koshi Tappu Wildlife Reserve (KTWR), Nepal using the contingent valuation method (CVM). In addition to contributing a CVM application from a seldom studied location to the literature, this case illustrates the sensitivity of WTA estimates to the analytical technique adopted. They analyzed households' willingness to accept (WTA) compensation using Tobit and double-hurdle regression models

that account for the censored distribution of WTA and nested yes/no decision implicit in the WTA responses. The average WTA of a household residing in the vicinity of KTWR is estimated to be $238, which amounts to nearly $ 1.64 million for the neighboring region. The results provide a basis to address local people's concerns in the process of sustainable management of natural resources and wetland ecosystems in KTWR, Nepal. One caveat in this study is that WTA is about twice the amount as conveyed by WTP (Horowitz and McConnell, 2002). So, the estimates is about half of what it would have been obtained from WTP.

Cook (2007) carried out a contingent valuation of Chitwan National Park to estimate the better entry fee for the park. From the 132 respondents who answered the willingness to pay question with a monetary response, the mean willingness to pay for entrance fees at Chitwan National Park was considerably higher than the prevailing entrance fee. At the time of this study, the price of the park entrance fee was 500 NRs, approximately equal to $7. The respondents' mean willingness to pay was $21.94 (the median was $14 and the standard deviation was $21.14) with a range from less than 7 to 100 US dollars in 2006

Baral et al. (2008) carried out contingent valuation surveys among 315 foreign visitors to the Annapurna Conservation Area, Nepal, during April and May of 2006. The objective of the survey was to determine willingness to Pay (WTP) for entry fee. The results of logit regression showed that the bid amount, family size, visitors' satisfaction, the use of a guide, and group size were the most significant predictors of WTP. The average per-visitor expenditure was US $ 309.8 per trip, so the total expenditure of 35,625 visitors was around US $ 11.million. Visitors also paid a US $ 27.0 entry fee for access which is categorized as revenue in the further analyses. The aggregate gross local economic impact (expenditures and fees) resulting from the 35,625 visitors in 2005 was roughly US $ 12 million. Previous study by Banskota and Sharma (1997) found that only 60% of tourist expenditures typically stayed within the local economy. They used this figure to estimate the net local economic impact from ecotourism to be around US $ 7 million. This yields a per capita net average annual income from tourism of approximately US $ 60 amongst the 120,000 residents of the region. Results suggest that most visitors would be willing to pay an entry fee considerably higher than the current fee of US $ 27. The mean and median WTP were 69.2 and 74.3 US dollars respectively. The most common explanation for WTP by respondents was a desire to better protect the environment. The most common explanation for unwillingness to pay was that the bid was simply too expensive. Two models were developed based upon different predictions of visitor numbers (an optimistic case and pessimistic case) to calculate the expected revenue production and likely gross local economic impact of candidate entry fees. Based on this analysis, they recommend an increase in the entry fee to $ 50. In the optimistic scenario, this higher entry fee leaves a budget surplus. In the pessimistic scenario, it would reduce current budget deficits.

KC et al. (2011) estimated the economic value of Baghmara community forest located in the Buffer Zone of Chitwan National Park. The research examined the value of ecosystem services in Baghmara BZ Community Forest of Nepal determining willingness of local users and tourists for sustainable management and conservation of natural resources as well as

recreational and aesthetic services, during September of 2010. The contingent valuation survey was administered to 95 users and 100 tourists. For users, the distance to forest, family size, nature of residence, gender and size of land holding seem to be the prominent factors that affected their willingness to pay. The mean WTP was US $ 0.48 per household (local users) per year. The projected average willingness to pay by all users for recreational and aesthetic services was NRs. 33,347 (about US$ 460) per year. The tourists were divided into domestic and international to elicit willingness to pay for ecosystem services. The responses varied according to the nature of tourists. For domestic tourists, income was only a factor that affected their willingness to pay, but for international tourists along with income, gender, travel group and education were major determinants of willingness to pay. The average projected total willingness to pay by all tourists was US$ 3.8 million per year. The research shows that the PA system of Nepal has a high potential to generate additional resources against ecosystem services with the condition that additional services are provided to the tourists and a mechanism to extract such contribution is established.

Sharma et al. (2011) carried out an economic valuation of Bardia National Park (BNP). The total social benefit generated by BNP amounted to NRs. 389.4 million. The total cost accordingly was NRs. 49.6 million. The cost incurred by the society in the form of losses of crops, livestock and property has already been adjusted in the provisioning services while estimating the Total Economic Value (TEV) of the area. The net benefit from the management of BNP as a national park was thus around NRs. 340 million. The benefit cost ratio revealed that the benefit was quite high with around NRs.8 accruing to the society for each rupee spent on the management and conservation of BNP. Per hectare cost and benefit of BNP to the society was also estimated. The average benefit amounted to NRs. 2,640 per hectare while the average cost amounted to NRs. 336 per hectare. Thus, there was a net benefit of NRs 2,304 per hectare.

Pant et al. (2012) carried out a quantitative estimate of the economic value of Kanchenjunga Conservation Area. The economic benefits generated by the flow of selective forest ecosystem services in the three districts was around NRs 8.9 billion per year (approximately US $ 125 million) equivalent to NRs 30,000 per hectare per year. Almost 80% of the total benefits (NRs 7.01 billion per year or approximately US $ 98 million) was from provisioning services, i.e., goods from the forests used directly or indirectly. Using the productivity method, the average benefit per household from ecosystem support services was estimated to be NRs 60,144 per year which was about NRs 1,703 per hectare. Supporting service created by ecosystem services contributed around 17.73 percent to agricultural crop production. This figure is estimated on the basis of agricultural land areas in conservation area and can be used to estimate the contribution of PAs in crop productivity until more specific data are available. The value of carbon sequestration services was also considerable at NRs 1.65 billion annually, close to 18% of the total value of the ecosystem services. But the unit value of carbon appears to be too high in the Nepalese context. The value of regulating and supporting services was estimated to be about NRs 1.89 billion per year (approximately US $ 26.6 million), providing a benefit per household of about NPs 16,238 per year if they are sold in the global market.

Lamsal et al. (2015) investigated the participation of local ethnic groups in wetland conservation, determined the economic benefits that they received from the wetlands, and assessed socioeconomic factors that affect dependency on wetlands. A total of 217 wetland resource-user households residing around Ghodaghodi Lake, western Nepal were surveyed. The wetland resources contributed significantly to the household economy of the local people. Each household extracted lake resources at an annual worth of NRs 4,379 (US $ 63), equivalent to 12.4% of the household total gross income. Although the people maintained a positive attitude toward wetland conservation, their participation in conservation efforts was inadequate. Socioeconomic factors such as larger household size, older age of the head of the family, and larger area of agricultural land increased the rate of resource extraction. In contrast, when households were involved with local conservation organizations, resource extraction was reduced.

Thapa (2016a) reviewed the people's perception on Koshi Tappu Wildlife Reserve (KTWR). This study found that the local people in and around the KTWR have negative attitude towards it. Only 34 per cent liked its presence whereas 58 per cent of the respondents were not happy to be included in the buffer zone. Reasons for disliking the reserve was mainly due to wildlife damage; restrictions in resource use; and arrest and prosecution of the people by the park authorities. In contrast, reasons for liking the reserve were the opportunities for natural resource use, biodiversity conservation, and tourism/business. The paper concludes that addressing the negative attitudes of local people helps the reserve authority to enhance long term sustainability of KTWR. The same author (2016b) estimates the recreational (economic) value of Langtang National Park. In order to evaluate the willingness to pay (WTP) for park entry fee and estimate the economic value of the park for tourism/recreation, contingent valuation study was conducted in autumn of 2014. The findings from the study suggest that the mean WTP for the park entry fee is $ 53.57 and median WTP is $ 50 which is higher than the current entry fee of $ 30. Further, entry fee of $ 50 yields the maximum revenue of $ 375,400 to the park provided that the hypothesized entry fee is realized and prospective visitors are willing to pay for this amount. Total economic value of the park is estimated to be $ 6.6 million.

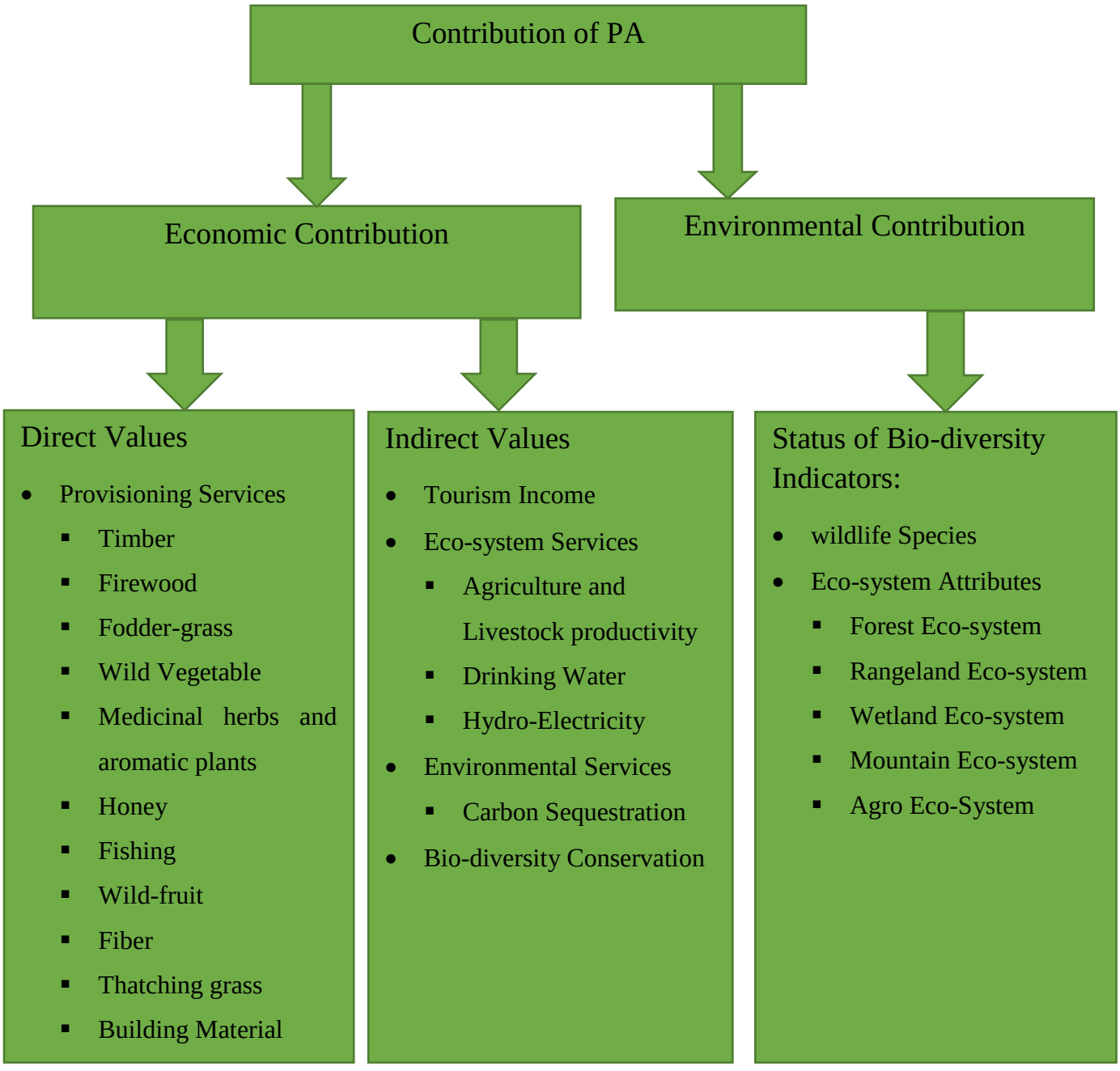
The review of the existing literature indicated that some literatures on the economic valuation of protected areas in Nepal are available. These literatures are mostly dominated by contingent valuation methods that follow the stated preferences methods. Contingent valuation methods are criticized for their weakness of overvaluation. A comprehensive economic valuation of the contribution of the PAs to the national economy of Nepal using credible study methodology is however lacking. The total economic valuation (TEV) is considered the most reliable technique of economic valuation of the flows of goods and services of PAs. Such an evaluation study would be highly beneficial for resource allocation decisions of the government and other stakeholders.

# SECTION THREE: METHODOLOGY

## 3.1 Conceptual Framework

PAs benefits can be categorized into economic and environmental contributions (Figure 1). The economic contribution is measured in terms of direct and indirect values useful for human being. The environmental contributions are measured in terms of ecological indicators such as the changes in the number and diversity of both flora and faunal species.

**Figure 1: Flow of economic benefits from PAs of Nepal**



## 3.2 Methods

The study estimates the economic value of PAs in the national economy of Nepal. It tries to produce information on economic valuation based on the national income accounting framework. The system of national accounts (SNA) follows the SNA 2008 framework and accordingly classifies economic activities along 15 activities by industrial division (MOF, 2017). These activities are listed in ANNEX-1. Six categories namely agriculture and forestry; fishing; mining and quarrying; electricity gas and water; hotel and restaurants; and transportation sector are related to the PAs. Two categories-fishing, and mining and quarrying were economically insignificant and were combined with other fours sector. Accordingly, this study estimated the contribution of the PAs to these four sectors. This valuation study attempts to create a satellite account of the PA system that could be useful for integration with the SNA.

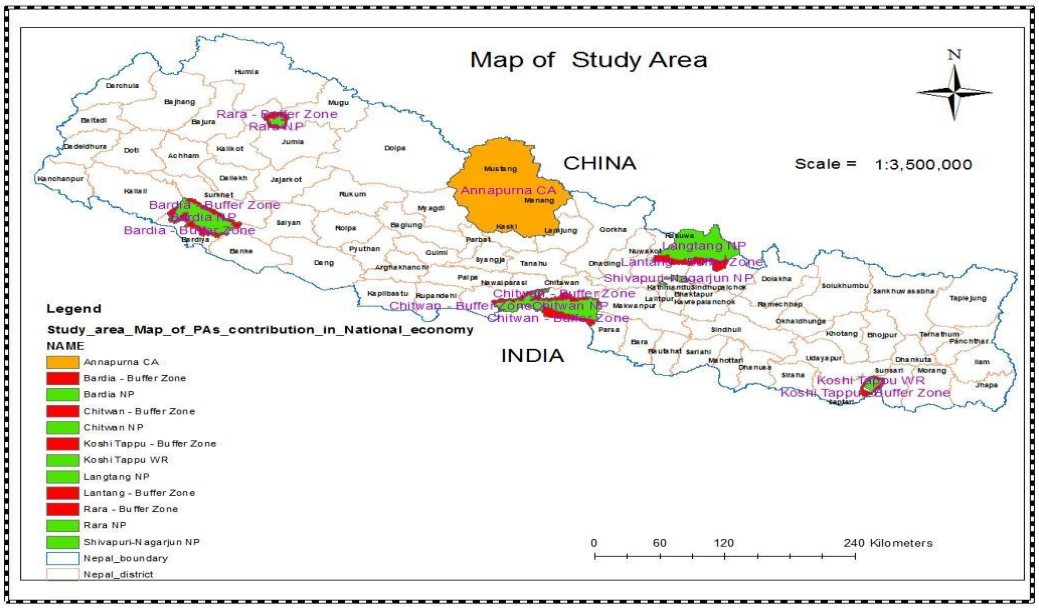
The most widely referred literature on economic valuation of ecosystem services such as the Millennium Ecosystem Assessment (MEA, 2005) and The Economics of Ecosystem and Biodiversity (TEEB, 2010) identified four categories of ecosystem services of economic significance in assessing the economic values of natural resources to the local economy. They are: provisioning, regulating, cultural and supporting services. Provisioning services refer to the production of goods of direct use such as timber, fuel, fiber, food, among others. Regulating services imply regulation of air quality, water, climate and diseases and pest controls. Cultural services imply the aesthetic, spiritual, recreational, ecotourism and educational services. Supporting services are services similar to regulating services. Outputs from regulating services occur within a short time while supporting services are generated in course of a longer period of time and their benefit flow accrue for a long period of time (MEA, 2005). Some examples of supporting service are soil formation, nutrient recycling and erosion prevention. Supporting services are not used by people directly but only indirectly through production function on other economic activities such are agriculture and livestock production. Regulating and supporting services are sometimes combined into a single category due to the similarity in terms of their indirect contribution in the production functions for various goods and services (for instance see MEA, 2005). This study categorizes all ecosystem services provided by the protected areas into these four major service categories.

This study identifies the various components of goods and services under each of the four services based on earlier studies from similar ecosystem services and from the reports published by the sampled PA offices. The analysis in this study covers a period of one fiscal year 2015/16. The data management system of the Government of Nepal follows the Nepalese calendar according to which the fiscal year starts approximately in mid-July and ends about the similar Roman date next year. This study estimates the value of the ecosystem services generated from the PAs as a minimum value. This is because a number of other services that could not be captured due to lack of reliable technical data have not been considered in this study. The goods and services covered in this section and the sources of data are presented in detail in sub-section 3.2.4 that discusses the tools of economic valuation.

## 3.2.1 Sampling Design

The study was carried out in selected seven protected areas (Koshi-Tappu Wildlife Reserves, Chitwan National park, Shivapuri Nagarjun National Park, Langtang National Park, Annapurna Conservation Area, Bardia National Park and Rara National Park) as per the terms of reference provided by the Department of National Parks and Wildlife Conservation (DNPWC). The economic value of the sampled protected areas has been extrapolated for the whole range of protected areas system in the country based on similarity of ecological belts.

**Figure 2: Location of study area**




Sample communities within the PAs were identified in consultation with the relevant PA authorities. Community level data were collected from at least two community clusters around/in the NP/WR/CA. In case of the Annapurna CA, data were collected from three clusters. These clusters were identified through Focus Group Discussions (FGDs) with the NP/WR/CA management team that included wardens, ecologists, tourism officers and other key staff.

## 3.2.2 Sources of Data

The data for the study was collected from both primary and secondary sources. Secondary sources comprised of sources such as the publications of the DNPWC, annual reports of the respective national parks/wildlife reserves/conservation area (NP/WR/CA) offices. The secondary data comprised of data on the bio-physical characteristics of the NP/WR/CA such as land use, plant and animal species, water resources utilization, tourist arrival, income from tourism etc. Primary data was collected from the respective NP/WR/CA communities, institutions and stakeholders on community level indicators. Data on electricity generation was obtained from the reports of Nepal Electricity Authority while data on water supplies in Kathmandu from Shivapuri Nagarjun National Park was obtained through communication with Kathmandu Upatyaka Khanepani Limited (KUKL).

### 3.2.3 Methods of Data collection

The community level data on provisioning services and other ecosystem services was collected through FGDs with key informants from local communities. Key informants were identified by the community members themselves with support from the staff of NP/WR/CA after primary consultation during the field visits. The Key informants comprised of the local managers of the buffer zone community forests, conservation area community members, leaders of local farmers, representatives of local government, school teachers and leaders of community organizations such as mothers group, and indigenous groups among others. Structured questionnaires were used to collect information based on group discussions and a consensus figure recorded. Notes were taken during discussions to record important insights.

Data on cultural services were collected through FGDs with representatives of the associations of hotel entrepreneurs and other tourism sector entrepreneurs in the local service beneficiary areas such as the major tourist centers in and around the periphery of the NP/WR/CA. Data on allied business in the tourism sector such as home stays, restaurants, tourist guides and other tourism services were also collected through the FGDs. The duration of the days spent in the PAs and the air fare to and from the PAs from Kathmandu were collected from travel agencies and their travel itineraries. Secondary data on income from PA entrance fees and other services were collected from DNPWC reports.

Technical data on the ecological services such as hydro-electricity generation within the protected areas and the downstream areas fed by PA catchments were collected from the PA authorities and Nepal Electricity Authority (NEA) sources.

### 3.2.4 Tools of Economic Valuation

This study follows the total economic valuation (TEV) as an economic tool for the valuation of the all significant goods and services flowing from a natural resource area such as a protected area in a particular year. TEV can be defined as the aggregated values of the amount of resources expressed in common units of money that the society will be losing if the protected areas were lost (Adger et al., 1995). The TEV is a method estimating the value of the flow of services rather than the stock. The major components in the TEV are discussed in the following headings.

***Provisioning services***

The major provisioning services from the sampled protected areas were timber, firewood, fodder-grass, leaf-litter, wild fruits and vegetables, tubers and mushrooms, medicinal herbs, fish, honey, thatching grasses and construction materials such as timber, poles, reed and bamboo, plant fibers, stones, boulders and clay etc. Information was collected on the total amount of these goods collected during the last fiscal year and the prevailing local market price. Since the protected areas differ by types such as national parks, Wildlife reserves or conservation areas, the items that are extractible also differed. For instance, there were no human settlements inside most of the national parks and reserves. People living around national parks cannot collect these goods from the NP but only from the buffer zones. In case of the CA, there are human settlements and private lands for farming and agro-forestry within

the PA. We collected data of extracted items both from public land as well as private land of the PAs.

For provisioning service items that were collected from protected areas, we used prevailing prices for commodities for which market existed. For commodities that were not transacted in market, we obtained prices using indirect methods such as prices of their close substitutes or the price based on value of collection times. Table 1 provides the components by service category and their data sources.

**Table 1: Components of total economic valuation (TEV) and sources of data**

| Service | Components | Sources of data |
|---|---|---|
| **Provisioning services** | Economic value of Timber, NTFPs, Food and fibers, sand, clay and boulders collected from protected areas | FGDs with key informants from local communities in the NP/WR/CA and buffer zones |
| **Cultural services (income from recreational and educational activities)** | Value addition by hotel and restaurant industry | FGD with tourism service managers; Hotel association members |
| | Value addition by tourism related other activities (tourist guide, elephant safari etc) | FGD with tourism relate allied activity managers |
| | Entrance fees, fines, royalties of PAs. | FGDs with NP/WR/CA staffs, Official records |
| **Regulatory services (economic contribution of protected areas in generating and regulating ecosystem services)** | Drinking water | FGDs with key informants from local communities in the NP/WR/CA and buffer zones; records from urban water supply institutions such as KUKL |
| | Electricity generation | PA Official records on micro-hydro plants, reports of Nepal Electricity Authority (NEA) |
| | Carbon sequestration | Benefit transfer method |
| | International funds received by government authorities for biodiversity conservation in NP/WR/CA | Records of DNPWC; International conservation agencies such as WWF, IUCN, World Bank etc |
| **Supporting services** | Indirect and long term contribution of ecosystem services to agriculture and livestock sector through soil formation, nutrient recycling, soil erosion prevention, | Benefit transfer method |

### *Cultural Services*

Protected areas that include forests, water bodies and other ecosystem provide cultural services by creating spiritual and religious values, aesthetic value, recreational and eco-tourism values and educational values for researchers (MEA, 2005). This study estimates the economic value of PA through tourism, educational and other recreational activities in the PA.

Tourism activities in PA contribute to the local and national economy. The incomes from the tourists accrue to the PA institution in the form of entrance fees and permits for recreational, educational and research activities. The other forms of income to the national economy are the lodging and food expenses in the hotels and allied businesses and the revenue to the transport industry in course of transportation services used by tourists. In addition to the incomes by the PA authorities, this study estimated the value addition by the hotel and allied economic activities, the expenditures made in the transportation sector (air and road).

We also estimated the total value addition based on seasonality of tourist flow, the total trip duration in the PA, daily expenses in food and lodging, occupancy rate and value addition. These data were differentiated for foreigner and Nepalese tourists. The data for tourists visiting the PAs were available only for foreign tourists from the PA. We collected information on the proportions of Nepalese and foreign tourists from the representatives of hotel associations in the PAs. The total number of Nepalese tourists visiting the PAs was estimated based on the total tourists and their proportion. The total value addition from the hotels and allied business were estimated based on the total duration of the trip in the PAs. The total durations of the trip were different for Nepalese and foreign tourists. The duration of travel for foreign tourists and Nepalese tourists were estimated based on travel itineraries provided by travel agencies.

The contribution of the PAs to the transport industry was estimated by collecting information on the percentage share of PA visitors travelling by air and land transport. Data on air fares for Nepalese and foreign tourists were collected from travel agents. Data on local transport fares were collected from the hotel business entrepreneurs.

### *Regulating Services*

This study estimated the value of regulating services of PA through its contribution to drinking water supply, energy generation, particularly hydro-power, and carbon sequestration and international conservation support receipts. This study is based on the analysis of the water regulation by watersheds covered by forest, shrub-land, grassland and other favorable land use practices. The contribution of PA to electricity generation was estimated following Guo et al. (2000) which estimated that 11 percent rainwater was absorbed by land with forest cover during the wet season. The recharge during the wet season was discharged leading to increased water flow by 14.75 percent during dry months (December-April). Accordingly, we considered 14.75 percent contribution of PAs on drinking water supply over a normal flow during dry season. The increased flow during dry seasons led to 0.0175 percent increase in the installed capacity of the hydropower plants. We applied this parameter to estimate the

contribution of similar land use in the protected areas. The power generated by the hydroelectricity plant in the five months was converted into kilo watt hour units produced during the five dry months. NRs. 10 is the electricity tariff per unit of the median range consumers (51-150 units) fixed by the Nepal Electricity Authority (NEA, 2016). This value was used to estimate the contribution of protected areas in hydroelectricity generation. We assumed that forests of National Parks and Reserves are carbon neutral and only carbon increment in the buffer-zone and conservation areas were considered. Due to lack of reliable technical data, other regulating services such as air quality regulation, pollination or disease and pest control were not considered in the study.

The value of bio-diversity services was estimated in terms of the total expenditure made by the international conservation agencies such as WWF-Nepal, IUCN-Nepal, NTNC, ZSL-Nepal Bird Conservation Nepal etc. directly or through the government of Nepal and other national civil society organizations. Data on expenditures made on PAs by these conservation agencies through various conservation and livelihood improvement programs were aggregated to obtain a proxy value of the conservation value created by the PAs and revealed in terms of the expenditure made by these agencies on them.

***Supporting Services***

Supporting services enter indirectly into the production function on economic activities related to the production of goods and services consumed or sold by the people in the PAs. The mechanism of how the ecosystem services enter into the production function and contribute to the output of agriculture and other economic activities are very complex for community members to understand. Thus obtaining realistic estimate of the supporting services of PA ecosystems at the user level would not be possible and requires indirect measurement techniques. We therefore followed a benefit transfer method from a previous study conducted by Pant et al. (2012) that estimated the supporting service contribution of conservation area in local agriculture. Using a production function approach, the study estimated that ecosystem services contributed around 17.73 percent of crop production in eastern Nepal under the agro-forestry system. We adopted this estimate and used the 17.73 percent of crop produced as contributed by supporting services

To obtain the value of crop produced in the PAs, we collected average production data on various crops produced in the study area and their local market prices. We factored the contribution of the supporting services on this value to estimate the positive contribution of supportive services provided by PAs in the sampled areas. Following available information from DNPWC (2016) and other literature (for instance, Tamang and Baral, 2008; Awasthi and Singh, 2015), we also collected data on the percentage share of crop damage and livestock depredation by wild animals in the study areas. This was considered as a negative contribution of the PAs on the local economy and was deducted from the gross positive contribution of ecosystem services to obtain a net contribution of the PAs to agriculture.

PAs have contributions in the livestock sector. A part of it was captured through the provisioning services in terms of tree and grass fodder and leaf litter collected by people for stall feeding and bedding material. A large part of livestock feed was still obtained through grazing. Grazing is still a common practice in the mountain, hills as well as the tarai. We considered livestock nutrient provided by rangeland as a proxy of the component contribution of supporting services. Studies have shown that around 50 percent of the total digestible nutrients came from forest sources. It also estimated that 36 percent of the total livestock feed was obtained from agricultural residue (Tulachan and Neupane, 1999) while another 36 percent of the total animal feed requirement was obtained through grazing in rangelands (Barsila, 2008). Since animal feed is the major single factor affecting livestock production, we considered 36 percent of the total value addition to the livestock income as a positive supporting service produced by PA ecosystems in the study area. As in case of agriculture, the livestock loss due to depredation is deducted to obtain a net value of supporting servicing from PAs.

## 3.3 Extrapolation for non-sampled PAs

The estimates from the sampled PAs were extrapolated for the non-sampled PAs on the basis of the similarities of ecological belts. The ecological belts were mountain, hills and the Tarai. The extrapolations were made on the basis of relevant ecosystem services. For instance, for the provisioning services, contribution to agriculture and livestock were extrapolated on the basis of the number of households in the PAs. Value addition by hotel, allied services and transport were extrapolated on the basis of number of foreign tourist arrival provided by DNPWC (2016). Value addition from regulating services such as hydro-electricity generation, urban drinking water and carbon sequestration were extrapolated based on the empirical studies cited earlier.

## 3.4 Methods for Environmental Assessment

The methods of environmental assessment comprises of identifying and evaluating the state of the bio-diversity resources, particularly animal species reported by DNPWC and examining the types of eco-system services and their status. This information was used to analyze the changes in the quality of the ecosystem based on perceptions of beneficiary communities and resource managers. An analysis of the status of the various eco-system services available within the PAs was also conducted. We asked the PA managers on the status of the available ecosystem services as deteriorating, constant or improved.

# SECTION FOUR: DATA PRESENTATION AND ANALYSIS

This section presents the findings from the field along with relevant analysis of the components of the ecosystem services and the economic valuation of the protected area system. The contribution of the PAs to the economy is first analyzed along with the associated ecosystem service components. The same services are again presented in terms of the industrial classification following the SNA. We analyze the economic values of these services along with their components for the sampled seven PAs and their communities and these values are extrapolated for other PAs in accordance with their ecological and other bio-physical and resource characteristics. The environmental evaluation from an ecological perspective is presented at the end. This section concludes with a discussion on the findings.

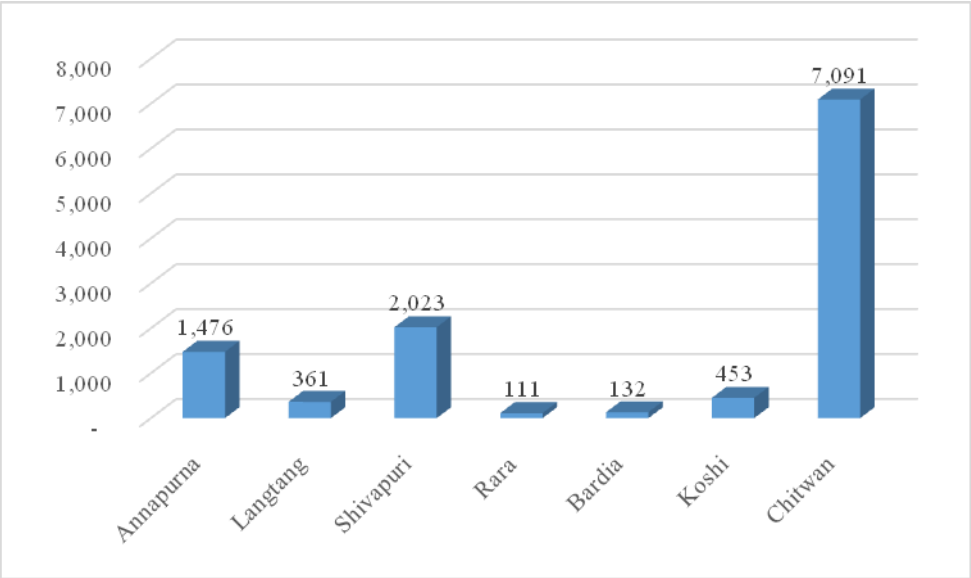
## 4.1 Economic Valuation

This section presents the finding from the sampled PAs in terms of the existence of the various components of the ecosystem services available and utilized by local communities. Ecosystem services in existence but not utilized by local communities for economic purposes were excluded.

### 4.1.1 Provisioning Services

The components of the provisioning services were timber, firewood, fodder-grass, leaf-litter, wild fruit and tuber, vegetables, medicinal and aromatic plants, Lokta and other raw materials, Allo and other knitting fibre, fish and other edibles, honey, thatching grass, construction materials, sand and boulders, clay/mud for construction etc. Among the various PAs, the highest value provisioning services was generated by Chitwan (NRs.7,091 million) followed by Shivapuri Nagarjun (NRs.2,023 million) and Annapurna (NRs. 1,476 million). The smallest volume of provisioning services was produced by Rara followed by Bardia, Langtang and Koshi Tappu. Chitwan had a high provisioning service value since it is the third largest in land area and had the highest number of households among the seven PAs. Figure 3 presents the values of provisioning services from these seven PAs. The provisioning service in Rara National Park was lowest due to very low value of extractions due to remoteness and absence of other physical infrastructures.

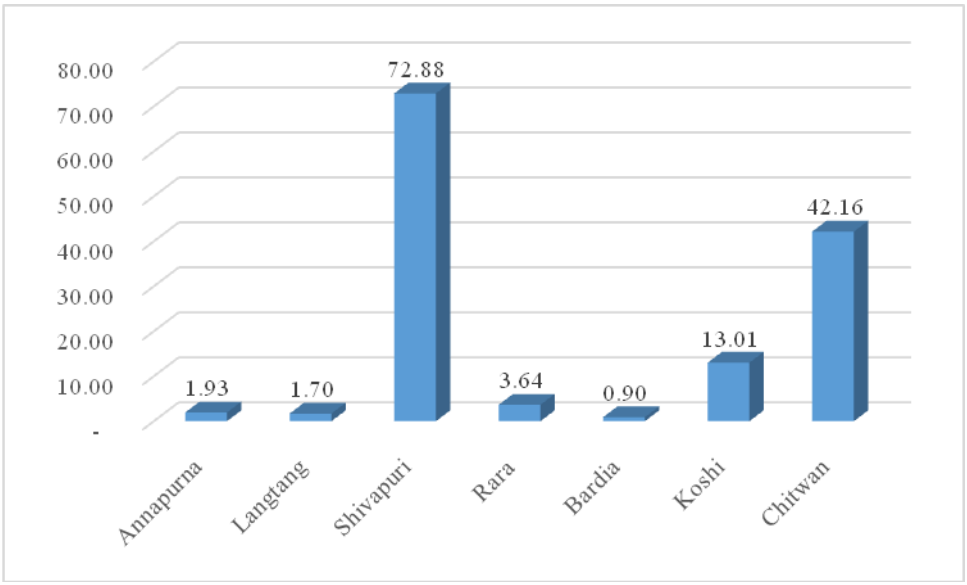
**Figure 3: Provisioning services in the sampled PAs (NRs.in million)**




*Source:* Field Survey, 2017

Value of provisioning services per hectares (Figure 4) gives a better picture of the actual scenario in relative terms. Accordingly, Shivapuri Nagarjun NP had the highest value of provisioning services per hectare followed by Chitwan and Koshi-tappu.

**Figure 4: Provisioning services per hectare from the sampled protected areas (NRs. In thousand)**




*Source:* Field Survey, 2017

Bardia had the lowest of around NRs. 896 per hectare followed by Langtang (NRs. 1,696, Annapurna (NRs. 1,935), and Rara (NRs.3,64). Shivapuri Nagarjun had high fire-wood and fodder-grass collection. The collection takes place mostly from the private lands in the buffer

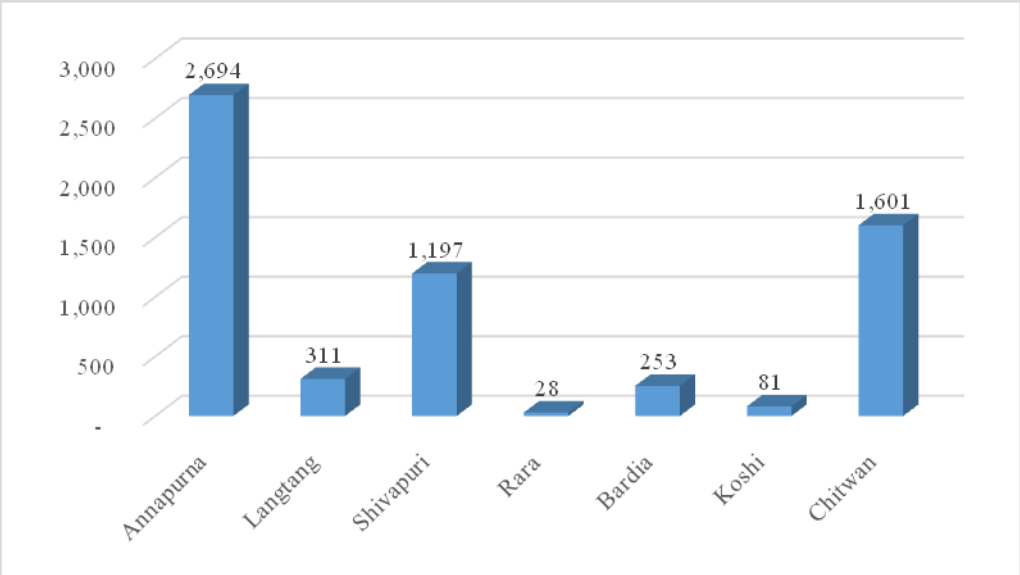
zone area rather than the NP area. The high value per hectare is also due to small area of Shivapuri Nagarjun NP.

### 4.1.2 Cultural Services

There were various components of cultural services such as entrance fees and permits collected directly by PAs and buffer zone management institutions, value addition by the hotels and allied economic entities such as home stays, restaurants, parlors and other service centers in the tourism centers. The travel expenditure incurred by nationals and foreigners in course of the visit to the PAs were another components of the cultural services. The expenditures made by students and researchers visiting the PAs for academic purpose was included in the revenue of the PAs.

Figure 5 provides information on the cultural values generated by these seven PAs. The highest value of cultural services was created by Annapurna CA (NRs. 2694 million) followed by Chitwan (NRs. 1601 million) and Shivapuri Nagarjun (NRs. 1197 million). The lowest cultural service value was generated by Rara NP (NRs. 28 million) followed by Koshi-Tappu (NRs. 81 million).

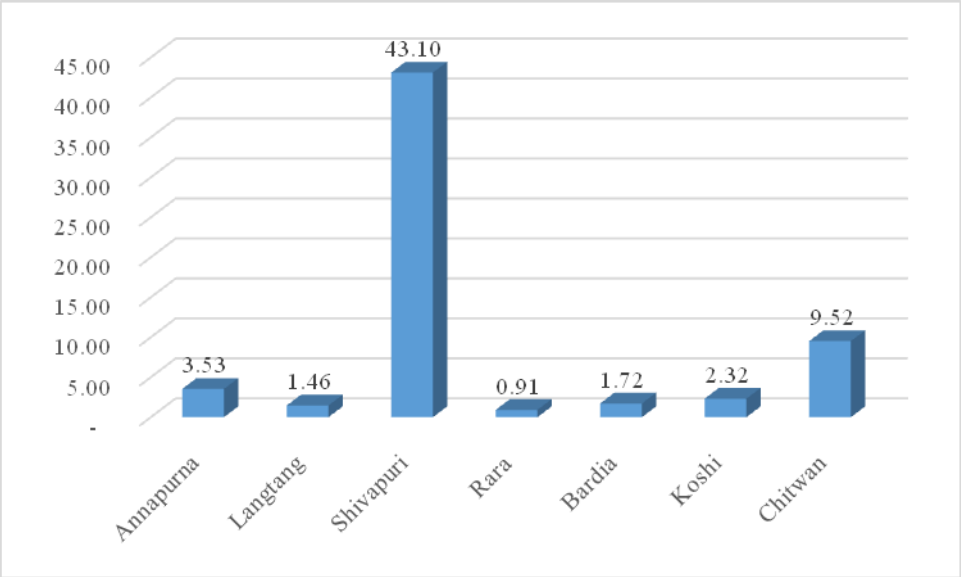
**Figure 5: Cultural services from the sampled protected areas (NRs. In million)**




*Source:* Field Survey, 2017

Figure 6 provides the value of cultural services per hectare from these seven PAs. In terms of cultural service value per hectare, Shivapuri Nagarjun generated the highest value (NRs. 4,310) followed by Chitwan (NRs. 9,517) and Annapurna CA (NRs. 3, 532).

**Figure 6: Cultural services per hectare from the sampled protected areas (NRs.. In thousand)**




*Source:* Field Survey, 2017

The lowest value of cultural services per hectare was generated by Rara NP (NRs. 914) followed by Langtang (NRs. 1,459), Bardia (NRs. 1,718) and Koshi-Tappu (NRs. 2,315). The lowest value of cultural services in Rara NP was due to the lowest number of visitors. Only 132 foreigners visited Rara NP while 83,419 foreign tourists visited Annapurna CA in fiscal year 2015/16. The cultural value created in Shivapuri Nagarjun was very high due to a large number of urban visitors and foreign tourists (143,352 visitors).

### 4.1.3 Regulating Services

Regulating services are services generated by the PAs but utilized by communities indirectly through other economic activities. The components of regulating services presented in the study sites and for which reliable data were available were measured through the contribution of PAs in drinking water, electricity generation, carbon sequestration and biodiversity payments received by PA management institutions.

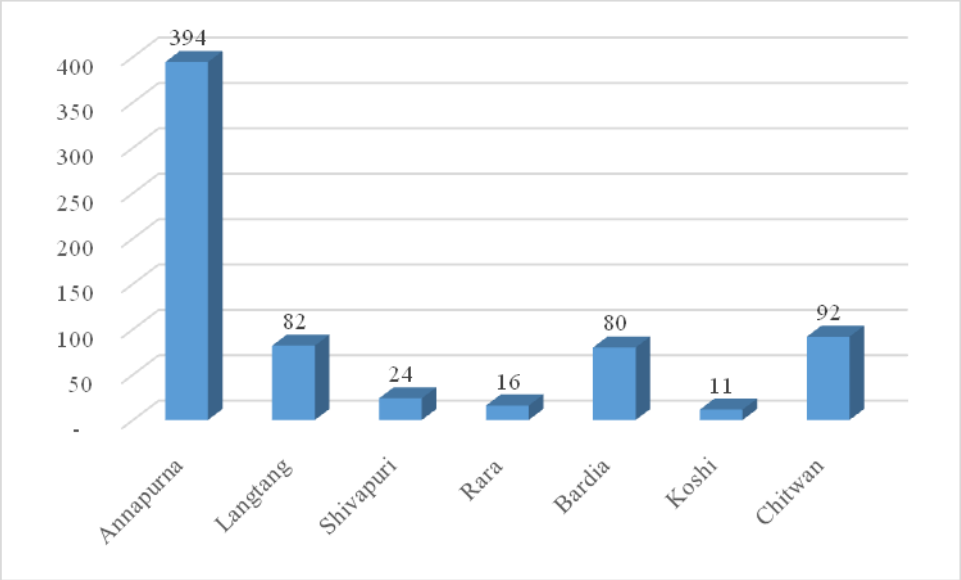
The value of bio-diversity services as discussed in the methodology section is based on the total expenditure made by the international conservation agencies directly or through the government of Nepal and other national civil society organizations.

The external assistance received by NTNC in the form of external assistance was NRs.459, 099 thousand in fiscal year 2015/16. Other sources of donor funding were WWF, IUCN, ZSL and BCN. This amount was assumed to be distributed proportionally to all the PAs on the basis of their land area.

Figure 7 provides the contribution of regulating services from seven PAs of Nepal. The total regulating services was highest for Annapurna CA (NRs.394million) followed by Chitwan (NRs. 92million) and Langtang (NRs. 82million). Annapurna and Langtang had high

regulating services mainly due to the hydroelectricity potentials of these PAs. Several hydro-electric power stations were installed in Annapurna CA and its downstream areas. Similar was the case with Langtang NP. Chitwan had high regulating service value due to large land area for which it has high carbon sequestration and external bio-diversity conservation receipt.

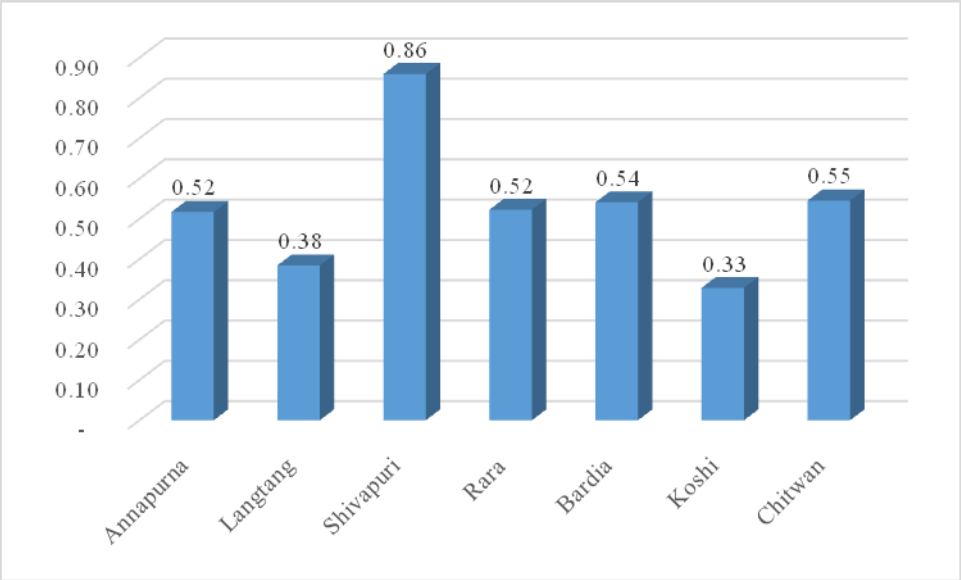
**Figure 7: Regulating services from the sampled protected areas (NRs. In million)**




*Source:* Field Survey, 2017

Koshi had the lowest regulating service generation (NRs. 11million) followed by Rara NP (NRs. 16 million). This was because these PAs had small land areas that limited their potential for carbon sequestration and international conservation support receipt. The main source of regulating services for Shivapuri Nagarjun was urban drinking water supply and hydroelectricity generation at Sundarijal. Kathmandu Upatyaka Khane Pani Limited (KUKL) is the public limited company supplying piped drinking water to the whole of Kathmandu. Out of the 130 million liters and 90 million liters drinking water is supplied per day by KUKL during wet and dry seasons respectively, Shivapuri Nagarjun National Park provides around 90 million and 62 million liters of water in the wet and dry season respectively. Following the study by Guo et al.(2000), of the 62 million liters supplied by KUKL from SNNP, 14.75 percent is due to the water recharged by Shivapuri Nagarjun National Park. The minimum price of 1000 liters of water charged by KUKL was NRs.. 10. Thus a monetary value of NRs..13.7 million was obtained as a value of drinking water flow from Shivapuri Nagarjun NP during the five dry months for urban water supply besides the rural water supply value.

**Figure 8: Regulating services per hectare from the sampled protected areas (NRs. In thousand)**




*Source:* Field Survey, 2017

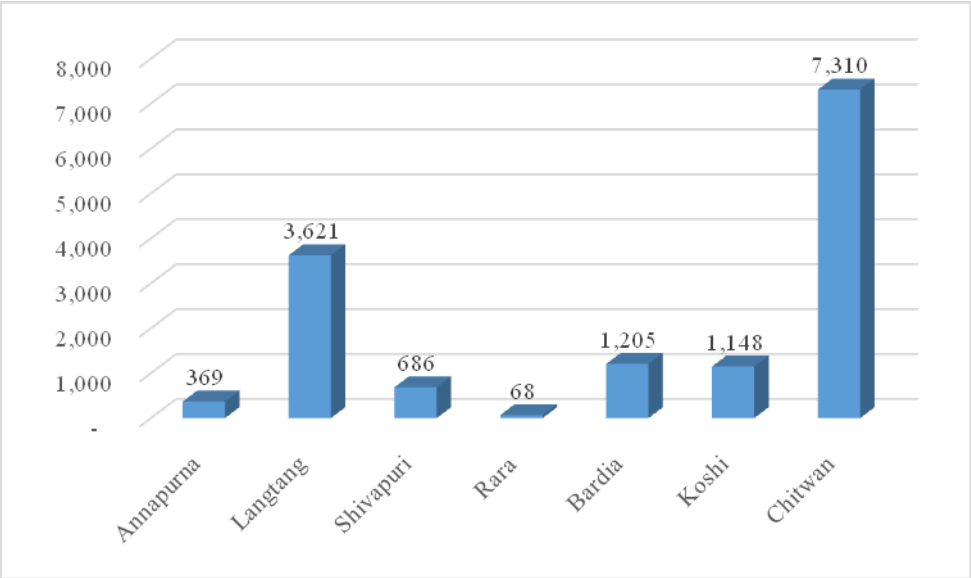
Figure 8 provides information on the regulating value per hectare generated by the seven PAs of Nepal. The per hectare value of regulating services were highest in Shivapuri Nagarjun (NRs. 860) followed by Chitwan NP (NRs.545), Bardia (NRs.541). The lowest value per hectare was found in Koshi-Tappu (NRs.329) and Langtang (NRs.384). Shivapuri Nagarjun had the highest regulating service per hectare value due to the electricity generation and drinking water supply in Kathmandu valley and with respect to its small land size.

The value of carbon sequestration has been included in the analysis though no international payment for carbon has been practiced yet. In the present study, it is assumed that core areas of the PAs are carbon neutral. However, there is carbon increment in the buffer zones and conservation areas. Carbon increment has been assumed at a rate of 5.05 tons per hectare per year for the Terai to a lowest of 1.95 tons per hectare in the high mountains. Carbon was priced at $5 per ton as per RIMC (2014).

### 4.1.4 Supporting Services

As discussed in the methodology section, supporting services are indirect services that enter into the economic value addition through agriculture and livestock production functions in course of years. The contribution of supporting services has been measured on a flow per year basis. Following the method discussed in the methodology section, we estimated that supporting services were highest in Chitwan (NRs. 7,310 million) followed by Langtang (NRs. 3,621 million). Chitwan and Langtang had high supporting service value due to their high ecosystem inputs in both agriculture and livestock income.

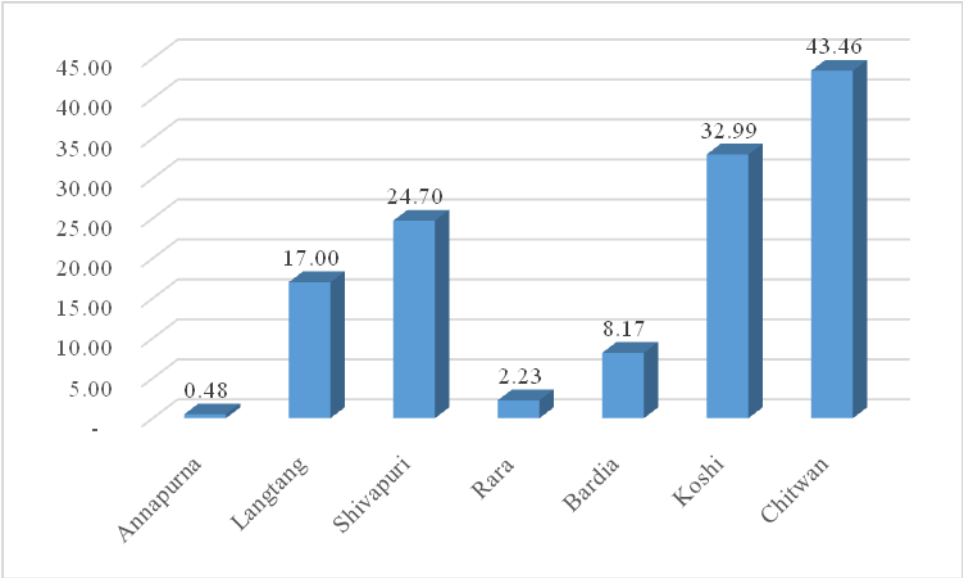
**Figure 9: Supporting services from the sampled protected areas (NRs.. In million)**




*Source:* Field Survey, 2017

In terms of per hectare ecomic value of supporting services, Chitwan had the highest value of (NRs.43.46 thousand) followed by Koshi-Tappu (NRs.32.99 thousand). Low value in Annapurna (NRs. 0.48 thousand) and Rara (NRs. 2.23 thousand) were due to less agriculture and livestock activities compared to other PAs. Our estimate showed that crop and animal income loss due to wildlife were around 6 and 9 percent of their respective total output value.

**Figure 10: Supporting services per hectare from the sampled protected areas (NRs. In thousand)**

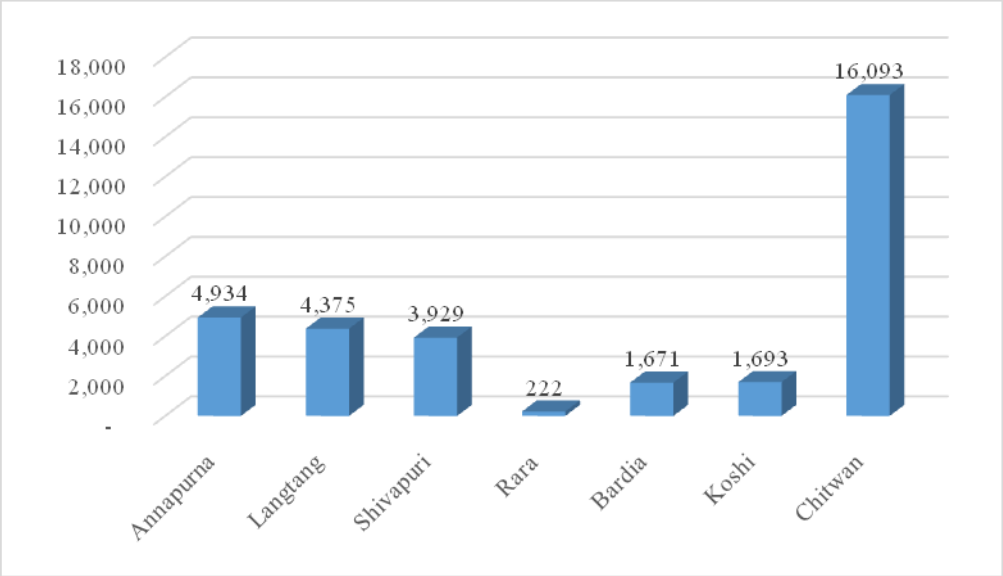



*Source:* Field Survey, 2017

### 4.1.4 Total Economic Value of Sampled Protected Areas

Figure 11 provides the total economic value of each of the seven PAs of Nepal. The total economic values are the aggregates of the provisioning services, cultural services, regulating services and supporting services. Some PAs have high value on one service with low value on other services. For instance, Annapurna had highest value on cultural services while Chitwan had high value on provisioning services. The total economic value provides an aggregate figure with these possible trade-offs between the services. The total economic values of the sampled PAs revealed that Chitwan had the highest total economic value (NRs. 16, 093 million) followed by Annapurna CA (NRs. 4,934 million) and Langtang (NRs.4,375 million). The lowest total economic value was found for Rara NP (NRs.222 million).

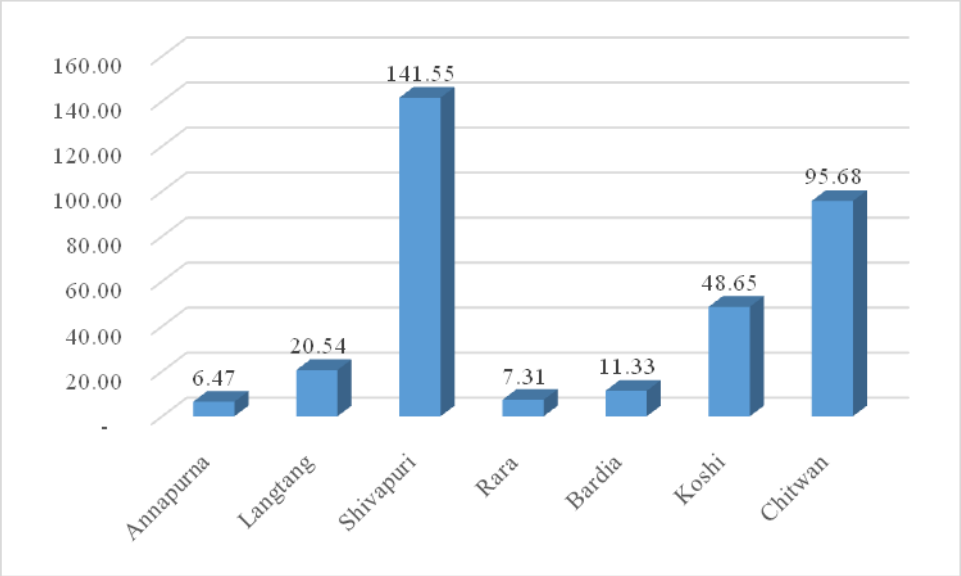
**Figure 11: Total economic value from sampled protected areas**




*Source:* Field Survey, 2017

Figure 12 presents the total economic values of these seven PAs based on per hectare basis. The total economic value of PAs in per hectare terms gave a different picture. The total economic value becomes high when comparable economic value has low area coverage. Shivapuri Nagarjun had the highest total economic value of NRs. 142 thousand per hectare followed by Chitwan NP (NRs. 96 thousand), Koshi (NRs.49 thousand). Shivapuri Nagarjun had the highest per hectare total economic value because it is relatively very close to urban centre and supplied urban amenities such as drinking water to Kathmandu along with hydro-electricity generation. It had a large number of tourists as well.

**Figure 12: Total economic value per hectare from sampled protected areas**




*Source:* Field Survey, 2017

The smallest total economic value per hectare was obtained for Annapurna (NRs 6.47 thousand) followed by Rara (NRs. 7.3 thousand). Annapurna had low per hectare total economic value because around 56 percent of its total land area is barren or snow covered and not suitable for economic activities.

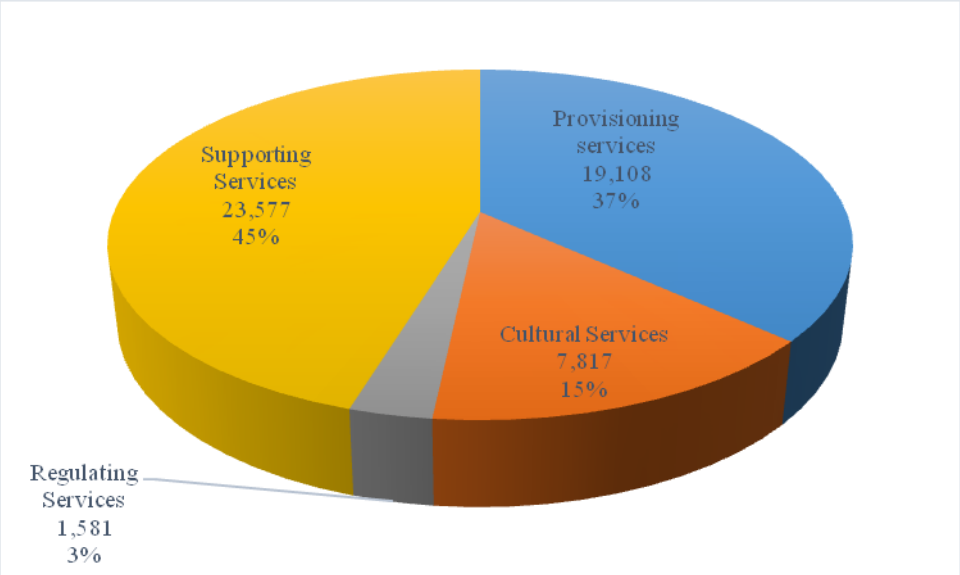
### 4.1.5 Estimated Economic Values of All Protected Areas

The economic contribution of other non-sampled PAs was obtained by extrapolating the relevant areas of the PAs based on the ecological location of these PAs. The extrapolations were based on several components. Provisioning services were estimated based on land use category. Among the cultural services, the income of PAs was based on actual values provided by DNPWC. Other components of cultural services such as value addition by hotels and other tourism related activities such as transportation were extrapolated by number of tourist arrival. Carbon sequestration was extrapolated based on forest cover in buffer zone area and conservation area. Estimated economic value of the non-sampled PA is provided in Annex-7

The total economic value by service category indicated that supporting services created the highest value (45percent). PAs and buffer-zone areas are all rural areas with high dependence on agriculture and livestock. PAs contributed to crop and livestock productivity through soil formation and water availability, nutrient recycling, preventing land disuse from soil erosion, primary production through grazing pastures. The second largest category was in the provisioning services (37percent). Communities depended on PAs for household needs such as timber, firewood, fodder-grass, leaf-litter. They also depended on collection and sales of medicinal herbs, honey, fibers for cash income. Firewood is still a primary source of domestic fuel for around three fourth of the rural population in Nepal (CBS, 2011). The third largest category was cultural services (15 percent).This was because PAs attracted tourists

both from home and abroad due their beautiful landscapes, bio-diversity, cultural values and adventure. The smallest contribution was from the regulating services due to relative backwardness in this sector. Regulating services are primarily the water regulation for drinking water and hydro-electricity generation. Water is used for household consumption rather than produced on a commercial basis in most of the PAs. Hydro-electricity generation was limited to Annapurna, and Langtang and their scale of operation were also small.

**Figure 13: Economic values of ecosystem Services of all PAs in Nepal by Service Category (NRs in Thousand Rupees and Percentage)**




*Source:* Field Survey, 2017

## 4.2 Contribution of Protected Areas in the National Economy

The system of national accounts, as discussed in the methodology section, itemizes all economic activities conducted within Nepal into 15 industrial categories. Among the 15 categories, goods and services produced by PAs fall into six categories. Among them two categories, fishing and mining, and quarrying were economically insignificant. Thus, we categorized all goods and services produced by PAs into four major categories: agriculture and forestry; electricity, gas and water; hotels and restaurants; and transport, storage and communications. The ecosystems inherent in these PAs contribute to the production of goods and services in the economy. Some are final outputs and their values have been estimated in direct monetary values. Some other services serve as input or intermediate goods in economic sectors such as agriculture and forestry. Their contribution in the volume of physical output has been estimated using indirect estimation methods. Thus the issue of double counting has been avoided while estimating the contribution of PAs in the national economy.

The estimated GDP for the fiscal year 2015/16 was NRs. 2,248,691 million (MOF, 2017). The total economic value of goods and services generated by the PAs of Nepal amounted to NRs 51,627.4 million. Thus, as a percentage share of the GDP, PAs contribution comes to 2.30 percent. This will rise to 2.32 if the proposed international payment for carbon

sequestration is realized. Within the four categories of goods and services, Agriculture and forestry contributed 1.94 percent. Agriculture contributed 1.05 percent while forestry sector contributed 0.89 percent. The contribution of the forestry sector to the GDP is estimated to be around 2 percent by CBS[1]. The other sectors were hotel and restaurant (0.25 percent); transport, storage and communications (0.09 percent) and; electricity, gas and water (0.01 percent). These findings revealed that PAs are adding value of primary production nature rather than manufacturing and service sector activities. Resources such as water for hydro-electricity generation, irrigation and other recreational activities from the PAs are grossly unutilized.

**Table 2: Total GDP Estimates and the contribution of PA in Nepal for the year 2015/16 (without the value of carbon sequestration)**

| S. N | Sectors | Amount in ten million | Percentage of GDP | Percentage of Total Value |
|---|---|---|---|---|
| **1** | **Agriculture and Forestry** | **4,366.08** | **1.94** | **84.57** |
| | (i) Agriculture | 2,357.73 | 1.05 | 45.67 |
| | (ii) Forestry | 2,008.35 | 0.89 | 38.90 |
| **2** | **Electricity, Gas and Water** | **14.93** | **0.01** | **0.29** |
| **3** | **Hotels and Restaurants** | **569.35** | **0.25** | **11.03** |
| **4** | **Transport, Storage and Communications** | **212.37** | **0.09** | **4.11** |
| | **Total** | **5,162.74** | **2.30** | **100.00** |
| | **GDP** | **224,869.10** | | |
| | **Contribution of PAs** | **2.30** | | |

*Source:* Field Survey, 2017

**Table 3: Total GDP Estimates and the Contribution of PA in Nepal for the Year 2015/16 (With the Value of Carbon Sequestration)**

| S. N | Sectors | Amount in ten million | Percentage of GDP | Percentage of Total Value |
|---|---|---|---|---|
| **1** | **Agriculture and Forestry** | **4,411.75** | **1.96** | **84.70** |
| | (i) Agriculture | 2,357.73 | 1.05 | 45.27 |
| | (ii) Forestry | 2,054.02 | 0.91 | 39.44 |
| **2** | **Electricity, gas and water** | **14.93** | **0.01** | **0.29** |
| **3** | **Hotels and restaurants** | **569.35** | **0.25** | **10.93** |
| **4** | **Transport, storage and communications** | **212.37** | **0.09** | **4.08** |
| | **Total** | **5,208.41** | **2.32** | **100.00** |
| | **GDP** | **224,869.10** | | |
| | **Contribution of PAs** | **2.32** | | |

*Source:* Field Survey, 2017

[1] Conversation with Mr.Uttam Narayan Malla, ex-Director General of the Department of CBS, Kathmandu.

## 4.3 Environmental Assessment

Protected areas are conserved for their bio-diversity contributions. Table 4 provides information on the present status of some of the key fauna of the respective PAs of Nepal. Interaction with the stakeholders indicated that some species are increasing in number while others are declining. It was difficult to attribute the declining numbers to the corresponding changes in ecosystem variables.

**Table 4: Main Fauna of the PAs and their Status**

| **Annapurna Conservation Area** | |
|---|---|
| Animal Species | Status |
| Snow Leopard | Improving |
| Himalayan Black Bear | Improving |
| Common Leopard | Improving |
| Red Panda | Constant |
| Lynx | Constant |
| Wolves | Improving |
| Kiang | Improving |
| Blue Sheep | Improving |
| Musk Deer | Improving |
| Red Fox | Constant |
| Himalayan Brown Bear | Constant |
| Tibetan Mammot | Improving |
| Great Tibetan Sheep | Constant |
| Himalayan Thar | Improving |
| Brown Ghoral | Improving |
| Barking Deer | Improving |
| Wild Boar | Improving |

| **Rara National Park** | |
|---|---|
| Animal Species | Status |
| Boar | Improving |
| Thar | Improving |
| Fox | Improving |
| Musk Deer | Declining |
| Jharal | Declining |
| Leopard | Declining |
| Red Panda | Improving |
| Lophophorus | Declining |
| Chir | Declining |
| Chyakhura | Declining |
| **Chitwan National Park** | |
| Animal Species | Status |
| Rhino | Improving |
| Tiger | Improving |
| Elephant | Improving |
| Bison | Improving |
| Ghadiyal | Improving |

| **Bardia National Park** | |
|---|---|
| Animal Species | Status |
| Rhinos | Improving |
| Tiger | Improving |
| Elephant | Improving |
| Dolphin | Declining |
| Crocodile | Constant |
| **Koshi Tappu Wildlife Reserve** | |
| Animal Species | Status |
| Arna | Improving |
| Wild Elephant | Improving |
| Bengal Florican | Improving |
| Fish Cat | Improving |
| Vulture | Improving |
| Migratory Birds | Declining |
| Ghadiyal | Declining |
| Turtle | Declining |

| **Langtang National Park** | |
|---|---|
| Animal Species | Status |
| Ghoral | Declining |
| Deer | Improving |
| Musk | Improving |
| Boar | Improving |
| mountain Leopard | Constant |
| Snow Leopard | Constant |
| Lophophorus | Improving |
| Pheasant | Improving |
| Red Panda | Declining |

*Source:* Field Survey, 2017

The following table 5 provides the environmental status of the seven PAs in terms of five ecosystem categories.

**Table 5: Environmental Status of Seven PAs of Nepal**

| Name of NP/WR/CA | Forest Ecosystem status | Rangeland ecosystem status | Wetland Ecosystem status | Mountain Ecosystem status | Agro-ecosystem status |
|---|---|---|---|---|---|
| Annapurna CA | Improving | Declining | Constant | Improving | Constant |
| Rara NP | Improving | Declining | Constant | Improving | Declining |
| Bardia NP | Constant | Improving | Constant | - | Improving |
| Koshi Tappu WR | Improving | Improving | Declining | - | Constant |
| Chitwan NP | Improving | Declining | Constant | - | Constant |
| Langtang NP | Improving | Improving | Constant | Improving | Constant |
| Shivapuri Nagarjun NP | Improving | Improving | Constant | Improving | Constant |

*Source:* Field Survey, 2017

## 4.4 Discussions

Protected areas are a means of reconciling development with biodiversity conservation. Establishing protected areas is not sufficient to protect biological diversity. In addition, protected areas need to represent diversity of the planet's ecological regions and include most critical sites for endangered species. Further, PAs need to be connected with each other to ensure sustainable bio-diversity outcomes. This requires cooperation with indigenous and local communities in the creation, control and management of protected areas and its ecological corridors (Secretariat of the Convention on Biological Diversity, 2014). There is a need of sufficient information for resource allocation for effective mechanisms to address the needs of the people in and around the PAs to ensure that their livelihood practices do not come into conflicts with the PA management requirements. Information on the economic values of the stocks and flows from protected areas are necessary for policy formulation and guiding behavior of local communities. The lack of economic value attached to the huge benefits provided by ecosystems has contributed to the loss of biodiversity. The real benefits of biodiversity, and the costs of its loss, need to be reflected within economic systems and markets (Secretariat of the Convention on Biological Diversity, 2010).

Though some economic valuation of the forestry sector has been conducted earlier, no economic valuation of the contribution of the PAs in the national economy has been made so far. The economic contribution of PAs can best be interpreted in relative terms to the economy of the nation as a whole. This study has been conducted in the form of a satellite account of the national economy. To make it compatible with the system of national accounts, this study has examined the economic contribution of the PAs in the four different sectors of the industrial division within the system of national accounts.

This study follows the revealed preference approach where the values derived from PAs are direct use values (provisioning services for instance) and indirect use values (recreational services for instance). Non-use values such as option, existence or bequest values have not been included in the study. Studies have indicated a wide range of services being generated by PAs in the form of provisioning services, regulating services, cultural services and support services. There are several components within each service (Groot et al. 2012) which are not included in this study primarily due to their nature as intermediate products or their magnitude being not of economic significance. For instance, the genetic resource value, value of air quality regulation, climate regulation, disturbance moderations, pollination, biological control, nursery service, genetic diversity value of PAs has not been included. This study aimed to estimate the economic value of PAs as minimum estimates. With additional technical data on economic contribution of PAs and concomitant improvement of capacities of communities in terms of social capital, human capital and built capital, these values will increase further in the future (Costanza et al 2014).

This study was conducted in the form of a rapid appraisal approach with information collected primarily from the key informants rather than from micro level data collected through household surveys. Though measures were employed to ensure data quality, there are still limitations to the accuracy of the data due to the data collection method employed.

Future research needs to be undertaken based on systematically designed surveys at regular intervals. The findings indicated that ecological services from protected areas amounted to NRs. 51,627.4 million. This comes to about 2.30 percent of the GDP of Nepal. Inclusion of carbon sequestration services raises this value to NRs. 52,084.1 million and this makes about 2.32 percent of the GDP. Among these values, the largest service was produced through supporting services (45percent) followed by provisioning services (37 percent), cultural services (15 percent) and regulating services (3 percent).

From a national income accounting framework, the largest share within the four sectors of the GDP contributed by PAs was the agriculture and forestry sector. This value was NRs. 4, 3660.8 million and constituted 1.94 percent of the GDP of Nepal in 2015/16 among which contribution through agriculture was 1.05 percent and contribution through forestry was 0.89 percent.

The other contribution of the PAs to the GDP of Nepal were from Hotel and restaurants NRs. 5,693.5 million (11.03 percent of PAs contribution and 0.25 percent of GDP); Transport, storage and communications NRs. 2,123.7 million (4.11 percent of PAs contribution and 0.09 percent of GDP); electricity gas and water NRs.149.3 million (0.29 percent of PAs contribution and 0.01 percent of GDP).

The above analysis indicated that the largest beneficiary of the PAs in Nepal is the agriculture and forestry sector. This is because of the prominence of the agro-forestry-livestock system prevalent in Nepal. The people living within the protected areas such as the buffer zone or conservation are the main economic agents conducting economic activities mainly agriculture and livestock keeping. Supporting services through input to agriculture and livestock in the buffer zones and conservation areas is a major ecosystem service provided by PAs. PAs provide nutrient recycling, soil erosion control and other services that contribute through the enhancement of land productivity and prevention of land disuse (Guo et al., 2001). These people also receive provisioning services through collection of timber, firewood, fodder-grass, leaf litter, wild fruits and vegetables etc.

Hotel and restaurants sector is the second largest economic contributor to the economic value of PAs (11.03 percent) and GDP (0.25 percent). Improving the quality and regularity of tourism services, particularly during off seasons can contribute to the local livelihood and the GDP of the country. The third contributory sector is the transportation, storage and communication sector. It contributes 4 percent of the economic value of the PAs and 0.09 percent of the GDP. This value comprises only of the transportation sector. The contribution of the communication and storage sector could not be accounted due to lack of reliable data.

Electricity, gas and water was the smallest contributor to the economic value of the PAs (0.29 percent value of the PAs and 0.01 percent of GDP) but is a sector with enormous future potential. A large number of hydro-electricity projects are under construction in the PAs and the rivers downstream will contribute to the economic value of the PAs in the future.

Recent estimates of the economic values across India indicated a per hectare value of tiger reserves to range between US$ 862 to 2,923 (Verma, 2017). The present study estimates the per hectare economic value for the 20 PAs in Nepal ranging from US$ 5 to 1,331. The high

estimates by Verma et al.(2017) were due to the inclusion of a wide range of ecosystem services that included 25 components that were of significance at the local, national to the global level. This study, however, tried to estimate the economic value from a national accounting perspective while excluding the services of global public goods. In comparison to Verma's estimates, this study values the final outputs rather than intermediate outputs.

The latest study (2016) on the US Park System showed that the economic value of the PAs of USA was about $62 billion. The GDP of the US in 2016 was estimated to be about $ 18.5 trillion. So, the GDP share from the PAs of the US was about 0.3 percent in 2016.

If we compare the present findings to a similar study in Bardia National Park by Sharma et al. (2011), the benefit from the Park was around NRs. 2,640 per hectare in 2011 using a very similar method and components. The present estimate is NRs. 11,327 from the same Park. This shows a 4.3 fold rise in the total ecosystem service value. The increase in the present nominal value could be due to factors such as the increased number of tourists, increased value of provisioning services and supporting services. The number of Nepalese tourists has increased almost two-fold in the BNP during the last 5 years. The average expenditure per Nepalese tourist in BNP was found to increase by more than two fold between 2010 and 2016. These and several other factors including incorporation of some additional components could be the reasons for the present value of BNP. This study recommends for a more comprehensive study with adequate time frame and resources for updating the present finding in the future.

# SECTION FIVE: CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Conclusions

Economic valuation provides valuable tools to policy makers related to management of natural resources to ensure efficient and optimal use of resources. The analysis of the various services of the PAs and their utilization indicated that in the order of contribution, supporting services, provisioning services and cultural services are of respective significance in the PAs of Nepal. The regulating services are significant in PAs where they are utilized for more commercial use such as hydroelectricity generation and drinking water supplies to cities. Economic values also appear to be higher where there are physical infrastructures to assess these PAs.

This is the first macro level study on the economic contribution of PAs in the total economy (Gross Domestic Products) of Nepal. This rapid assessment of the PAs indicates that about 2.3 percent of the total GDP of Nepal is contributed by these 20 PAs of Nepal.

## 5.2 Recommendations

Based on the findings from the study, some general suggestions can be made. The analysis of regulatory services has shown that PAs contribute to hydroelectricity and drinking water supply that are already in operation in the PAs and downstream locations. PAs contribute to around 15 percent of the flow of water in the dry seasons which are mostly water scarce periods. Private sector operating hydroelectricity generation and water supplies to urban areas should be imposed with royalty payments to strengthen PA management and ensure better supply of these services in the future.

The actual volume and cost of crop and livestock depredation were 6 and 9 percent respectively. However households were found to be putting significant efforts in preventing wildlife damaging crops and livestock. This has been imposing hardship and sufferings on the local communities. PAs produce public goods of local to global value. Thus mechanism should be developed for resource transfer from international conservation agencies as a compensatory payment to improve livelihood of local communities. Relocation of communities and conversion of severely affected cropland into forestland could be a long term solution to reduce human-wildlife conflict in the future. Transforming traditional crops into high value crops less damaged by wildlife in the buffer-zone has already been practiced in some buffer zone areas. This could be up-scaled in other areas as well.

Tourism provides an avenue for local communities to reduce their dependence on farm and forest based incomes. Locals rather than outsiders should be encouraged to undertake tourism activities through soft loans and trainings. This is already taking place in several PAs but need to be expanded in other PAs.

Hotel entrepreneurs in several sites complained about the trekking routes being in risky condition due to landslides and absence of bridges. This limits the local communities from obtaining benefits from the tourism sector. PA authorities should institute mechanism for

collaboration with the hotel entrepreneurs for building and maintaining infrastructures for better income to local communities.

The data collection and management by the PA authorities was found to be inadequate in several aspects. In the mountain PAs where Nepalese tourists are not imposed any entrance fee, there were no records of Nepalese visitors. This leads to lack of information on the anthropogenic pressures on PAs that is vital for PA managers. Nepalese visitors make a significant share in the tourism activities. It also imposes pressure in the bio-diversity resources in the PAs. Maintaining some entry fee will help to regulate the number of Nepalese tourist. The fee thus generated could be utilized to improve activities such as regular waste collection and disposal, trekking path maintenance and improvement of other amenities.

In the mountain PAs, local people are largely depending on the forests particularly firewood, fodder and timber for their daily livelihoods. In many instances, settlements and wildlife habitats overlapped each other. Therefore, regular assessment of migration and its impact on wildlife habitat may helps in more realistic planning of PAs.

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# ANNEXES

## ANNEX-1

### Components of the System of National Accounts in Estimating the GDP of Nepal

1. Agriculture and Forestry
2. Fishing
3. Mining and Quarrying
4. Manufacturing
5. Electricity, gas and water
6. Construction
7. Wholesale and retail trade
8. Hotels and restaurants
9. Transport, storage and communication
10. Financial intermediation
11. Real estate, renting and business
12. Public administration and defense
13. Education
14. Health and social work
15. Other, community, personal service and other activities

**ANNEX-2**

**Land Area Use of Sampled National parks/ Wildlife Reserve/Conservation Areas (Ha)**

| | Annapurna | Langtang | Shivapuri-Nagarjun | Rara | Bardia | Koshi | Chitwan | Total |
|---|---|---|---|---|---|---|---|---|
| Ecological belt | Hills | Hills | Hills | Hills | Terai | Terai | Terai | |
| Total households | 18680 | 12256 | 12125 | 2573 | 17172 | 14127 | 59707 | 136640 |
| Forest Land Area | 1455.18 | 708.76 | 159.94 | 203.43 | 1168.08 | 7.73 | 1149.81 | 4852.92 |
| Grassland Area | 1607.96 | 176.38 | 7.14 | 55.32 | 27.44 | 135.33 | 78.98 | 2088.55 |
| Agriculture Land Area | 234.55 | 119.76 | 110.08 | 33.39 | 198.47 | 124.38 | 295.88 | 1116.50 |
| Water body Area | 13.16 | 2.96 | 0.12 | 11.86 | 25.80 | 38.06 | 45.33 | 137.29 |
| Snow Covered Area | 390.78 | 86.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 476.82 |
| Built area | 0.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.97 | 1.03 | 2.06 |
| Barren Land Area | 3907.87 | 1034.17 | 0.19 | 0.00 | 53.84 | 36.21 | 109.65 | 5141.91 |
| Other Land Area | 19.51 | 1.88 | 0.15 | 0.00 | 1.36 | 5.32 | 1.32 | 29.55 |
| Total Area of PA | 7629.00 | 2130.00 | 277.61 | 304.00 | 1475.00 | 348.00 | 1682.00 | 13845.61 |

**ANNEX-3**

## Total Economic Value Originating from National parks/ Wildlife Reserve/Conservation Areas (NRs '000)

| | Annapurna | Langtang | Shivapuri-Nagarjun | Rara | Bardia | Koshi | Chitwan | Total | Average | Percent |
|---|---|---|---|---|---|---|---|---|---|---|
| Fees and Permits | 144,316.6 | 16,211.2 | 16,159.8 | 1,409.5 | 24,617.1 | 2,181.3 | 116,853.7 | 321,749.3 | 45,964.2 | 1.0 |
| Provisioning Services | 1,475,841.8 | 361,342.28 | 2,023,211.5 | 110,789.8 | 132,180.2 | 452,704.75 | 7,090,795.6 | 11,646,866.0 | 1,663,838.0 | 35.4 |
| Hotels | 1,313,113.2 | 25,153.2 | 1,122,536.0 | 4,129.8 | 22,510.4 | 16,164.2 | 618,725.0 | 3,122,331.7 | 446,047.4 | 9.5 |
| Other Tourism Services | 62,244.0 | 249,356.3 | 29,925.0 | - | 148,032.0 | 14,904.0 | 543,316.5 | 1,047,777.8 | 149,682.5 | 3.2 |
| Agriculture value addition | 152,194.1 | 304,534.2 | 147,074.8 | 45,493.4 | 15,417.6 | 24,133.0 | 804,097.2 | 1,492,944.4 | 213,277.8 | 4.5 |
| Livestock value addition | 216,964.2 | 3,316,876.8 | 538,736.8 | 22,328.1 | 1,189,976.0 | 1,124,024.4 | 6,506,043.9 | 12,914,950.2 | 1,844,992.9 | 39.2 |
| Drinking water | 1,006.0 | 652.0 | 14,608.7 | 34.2 | 1,835.2 | 1,483.6 | 6,375.4 | 25,995.1 | 3,713.6 | 0.1 |
| Electricity | 98,204.7 | 5,740.6 | 37.4 | | | | | 103,982.7 | 34,660.9 | 0.3 |
| Carbon Sequestration | 78,926.5 | 15,123.5 | 1,351.3 | 7,249.0 | 36,178.9 | 98.1 | 37,687.3 | 176,614.7 | 25,230.7 | 0.5 |
| External Biodiversity Payment | 216,185.9 | 60,358.6 | 7,866.7 | 8,614.6 | 41,797.6 | 9,861.4 | 47,663.5 | 392,348.4 | 56,049.8 | 1.2 |
| Transport | 1,174,730.5 | 20,064.0 | 27,953.6 | 22,257.9 | 58,178.9 | 47,323.8632 | 321,837.4 | 1,672,346.1 | 238,906.6 | 5.1 |
| Total | 4,933,727.5 | 4,375,412.5 | 3,929,461.8 | 222,306.3 | 1,670,723.8 | 1,692,878.7 | 16,093,395.6 | 32,917,906.3 | 4,702,558.0 | 100.0 |
| Total Area of PA in sq. km | 7,629.0 | 2,130.0 | 277.6 | 304.1 | 1,475.0 | 348.0 | 1,682.0 | 13,845.7 | 1,978.0 | |
| Total Area of NP/WR/CA (in Ha) | 762,900.0 | 213,000.0 | 27,761.0 | 30,407.0 | 147,500.0 | 34,800.0 | 168,200.0 | 1,384,568.0 | 197,795.4 | |

*Source:* Field Survey, 2017

**ANNEX-4**

## Components of the Provisioning Services of the Sampled Area (Ha)

| Items | Annapurna | Langtang | Shivapuri Nagarjun | Rara | Bardia | Koshi | Chitwan |
|---|---|---|---|---|---|---|---|
| Timber | 1,313.38 | 7,884.98 | 19,180.66 | 20,442.04 | 55,724.57 | 29,291.40 | 961,265.72 |
| Firewood | 359,291.51 | 265,689.51 | 946,402.69 | 46,314.00 | 27,537.55 | 62,244.23 | 2,180,430.77 |
| Fodder grass | 535,730.85 | 68,393.62 | 441,319.88 | 26,617.24 | 857.30 | 186,732.70 | 1,046,279.08 |
| Leaf-litter | 43,329.90 | 18,409.71 | 612,274.84 | 2,617.36 | 2,857.67 | - | - |
| Wild fruit | - | - | 107.32 | 2,022.91 | - | - | - |
| Wild vegetable | 69,462.64 | - | 49.42 | - | - | - | 2,878,680.12 |
| Lokta | 385.15 | - | - | - | - | - | - |
| Allo | 785.72 | - | - | - | - | - | - |
| Fish | 10,562.87 | - | - | - | - | 57,667.45 | - |
| Honey | 193,212.82 | - | - | - | - | - | - |
| Thatching grass | 4,814.43 | - | - | - | - | 95,349.62 | 20,371.19 |
| Building material | 57,474.70 | - | - | - | - | - | - |
| Sand Boulder | 37,899.22 | 964.45 | 2,727.25 | 12,776.28 | 38,968.23 | - | 3,768.67 |
| clay mud | 9,074.24 | - | 1,149.49 | - | 6,234.92 | 21,419.34 | - |
| NTFP | 152,504.35 | | | | | | |

*Source:* Field Survey, 2017

**ANNEX-5**

**Economic value originating from National parks/ Wildlife reserve/Conservation areas (NRs '000) per hectare per year**

| | Annapurna | Langtang | Shivapuri Nagarjun | Rara | Bardia | Koshi | Chitwan | Total | Average | percentage |
|---|---|---|---|---|---|---|---|---|---|---|
| Fees and permits | 0.2 | 0.1 | 0.6 | 0.0 | 0.2 | 0.1 | 0.7 | 1.8 | 0.3 | 0.5 |
| Provisioning services | 1.9 | 1.7 | 72.9 | 3.6 | 0.9 | 13.0 | 42.2 | 136.2 | 19.5 | 41.1 |
| Hotels and other | 1.7 | 0.1 | 40.4 | 0.1 | 0.2 | 0.5 | 3.7 | 46.7 | 6.7 | 14.1 |
| Other tourism services | 0.1 | 1.2 | 1.1 | - | 1.0 | 0.4 | 3.2 | 7.0 | 1.0 | 2.1 |
| Agriculture value addition | 0.2 | 1.4 | 5.3 | 1.5 | 0.1 | 0.7 | 4.8 | 14.0 | 2.0 | 4.2 |
| Livestock value addition | 0.3 | 15.6 | 19.4 | 0.7 | 8.1 | 32.3 | 38.7 | 115.0 | 16.4 | 34.7 |
| Drinking water | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.1 | 0.2 |
| Electricity | 0.1 | 0.0 | 0.0 | - | - | - | - | 0.2 | 0.0 | 0.0 |
| Carbon sequestration | 0.1 | 0.1 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2 | 0.9 | 0.1 | 0.3 |
| External Biodiversity Payment | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 2.0 | 0.3 | 0.6 |
| Transport | 1.5 | 0.1 | 1.0 | 0.7 | 0.4 | 1.4 | 1.9 | 7.0 | 1.0 | 2.1 |
| Total | 6.5 | 20.5 | 141.5 | 7.3 | 11.3 | 48.6 | 95.7 | 331.5 | 47.4 | 100.0 |

*Source:* Field Survey, 2017

**ANNEX-6**

## Land Area Use of Non-Sampled PAs (Ha)

| | Api-Nampa | Banke | Dhorpatan | Gaurishankar | Kachanjunga | Khaptad | Krishnasar | Makalu-Barun | Manaslu | Parsa | Sagarmatha | Shey phoksundo | Suklaphant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ecological belt | Mountain | Terai | Hilly | Mountain | Hilly/Mountain | Mountain | Terai | Mountain | Hilly/Mountain | Terai | Mountain | Mountain | Terai |
| Forest Land Area | 756.7 | 812.4 | 500.1 | 925.9 | 496.3 | 327.1 | 0.1 | 1106.4 | 264.3 | 755.6 | 128.4 | 354.0 | 288.9 |
| Grassland Area | 482.5 | 2.8 | 444.3 | 189.9 | 30.2 | 18.4 | 2.0 | 13.5 | 395.4 | 2.6 | 97.3 | 997.2 | 50.9 |
| Agriculture Land Area | 102.7 | 38.1 | 28.8 | 197.2 | 19.8 | 92.6 | 14.5 | 158.3 | 30.4 | 79.1 | 10.7 | 46.6 | 169.2 |
| Water body Area | 3.7 | 5.7 | 2.9 | 3.1 | 5.6 | 0.1 | 0.2 | 10.8 | 1.2 | 1.9 | 9.5 | 18.2 | 9.1 |
| Snow Covered Area | 33.5 | 0.0 | 11.6 | 73.6 | 316.3 | 0.0 | 0.0 | 194.0 | 114.5 | 0.0 | 230.7 | 128.9 | 0.0 |
| Built area | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Barren Land Area | 513.9 | 33.9 | 337.3 | 784.4 | 1161.2 | 2.9 | 0.0 | 840.4 | 850.8 | 72.9 | 941.5 | 3358.4 | 30.3 |
| Other Land Area | 10.0 | 0.0 | 0.0 | 4.8 | 5.4 | 0.0 | 0.1 | 6.7 | 6.4 | 0.6 | 4.8 | 0.8 | 0.1 |
| Total Area of PA | 1903.0 | 893.0 | 1325.0 | 2179.0 | 2035.0 | 441.0 | 17.0 | 2330.0 | 1663.0 | 912.7 | 1423.0 | 4904.0 | 548.5 |

**ANNEX-7**

## Total Economic Value Originating from Non-Sampled Areas (NRs '000)

| | Api-Nampa | Dhorpatan | Gaurishankar | Kachanjunga | Khaptad | Makalu-Barun | Manaslu | Sagarmatha | Shey phoksundo | Banke | Krishnasar | Parsa | Suklaphant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fees and permits | 17,345.0 | 369.1 | 4,914.1 | 5,204.3 | 430.8 | 3,195.7 | 1,481.0 | 67,195.3 | 12,938.0 | 17,198.2 | 69.7 | 4,962.0 | 9,418.1 |
| Provisioning services | 780,243.9 | - | 1,061,935.7 | 93,375.2 | 462,176.6 | 615,684.3 | 169,606.9 | 140,889.5 | 161,687.8 | 1,121,587.6 | 11,976.6 | 951,721.6 | 1,890,370.2 |
| Hotels and other | 694.7 | 2,179.8 | 44,075.7 | 12,025.0 | 503.0 | 19,834.1 | 54,783.2 | 665,782.2 | 10,324.2 | - | 56,213.8 | 932.6 | 7,685.1 |
| Other tourism services | 96.2 | 302.0 | 6,106.8 | 1,666.1 | 69.7 | 2,748.1 | 7,590.4 | 92,246.5 | 1,430.5 | - | 60,391.2 | 1,001.9 | 8,256.2 |
| Agriculture value addition | 127,571.4 | - | 173,628.6 | 15,267.0 | 75,566.8 | 100,665.6 | 27,731.1 | 23,035.7 | 26,436.3 | 123,275.7 | 1,316.4 | 104,605.4 | 207,774.0 |
| Livestock value addition | 804,552.0 | - | 1,095,019.9 | 96,284.2 | 476,575.5 | 634,865.6 | 174,890.9 | 145,278.8 | 166,725.1 | 1,288,804.6 | 13,762.2 | 1,093,613.4 | 2,172,204.6 |
| Drinking water | 3,202.7 | - | 4,359.0 | 383.3 | 1,897.1 | 2,527.3 | 696.2 | 578.3 | 663.7 | 1,416.5 | 15.1 | 1,202.0 | 2,387.5 |
| Carbon sequestration | 43,053.3 | 24,466.9 | 52,683.6 | 26,919.9 | 7,297.7 | 35,332.7 | 14,334.1 | 4,755.2 | 11,178.7 | 33,112.4 | 10.8 | 19,815.5 | 7,123.7 |
| External Biodiversity Payment | 53,926.0 | 37,547.0 | 61,747.2 | 57,666.6 | 12,496.8 | 66,026.1 | 47,125.1 | 40,324.1 | 138,966.5 | 25,305.3 | 480.3 | 25,863.2 | 15,543.1 |
| Transport | 350.9 | 1,101.0 | 22,262.1 | 6,073.7 | 254.1 | 10,017.9 | 27,670.3 | 336,278.2 | 5,214.6 | - | 36,541.6 | 606.2 | 4,995.7 |
| Total | 1,831,036.1 | 65,965.9 | 2,526,732.6 | 314,865.2 | 1,037,268.0 | 1,490,897.4 | 525,909.1 | 1,516,363.8 | 535,565.5 | 2,610,700.4 | 180,777.8 | 2,204,323.9 | 4,325,758.3 |
| Total Area of PA in sq. km | 1,903.0 | 1,325.0 | 2,179.0 | 2,035.0 | 441.0 | 2,330.0 | 1,663.0 | 1,423.0 | 4,904.0 | 893.0 | 17.0 | 912.7 | 548.5 |
| Total Area of NP/WR/CA (in Ha) | 190,300.0 | 132,500.0 | 217,900.0 | 203,500.0 | 44,100.0 | 233,000.0 | 166,300.0 | 142,300.0 | 490,400.0 | 89,300.0 | 1,695.0 | 91,269.0 | 54,850.0 |

*Source:* Field Survey, 2017

**ANNEX-8**

**Total Value of Different Services Generated by Sampled PAs (In Rs. '000)**

| | | Annapurna | Langtang | Shivapuri-Nagarjun | Rara | Bardia | Koshi | Chitwan | Total |
|---|---|---|---|---|---|---|---|---|---|
| Provisioning services | | 1,475,841.8 | 361,342.28 | 2,023,211.5 | 110,789.8 | 132,180.2 | 452,704.7 | 7,090,795.6 | 11,646,866.0 |
| Cultural Services | Fees and permits | 144,316.6 | 16,211.2 | 16,159.8 | 1,409.5 | 24,617.1 | 2,181.3 | 116,853.7 | 321,749.3 |
| | Hotels and other | 1,313,113.2 | 25,153.2 | 1,122,536.0 | 4,129.8 | 22,510.4 | 16,164.2 | 618,725.0 | 3,122,331.7 |
| | Other tourism services | 62,244.0 | 249,356.3 | 29,925.0 | - | 148,032.0 | 14,904.0 | 543,316.5 | 1,047,777.8 |
| | Transport | 1,174,730.5 | 20,064.0 | 27,953.6 | 22,257.9 | 58,178.9 | 47,323.9 | 321,837.4 | 1,672,346.1 |
| | Total | 2,694,404.3 | 310,784.6 | 1,196,574.5 | 27,797.2 | 253,338.3 | 80,573.4 | 1,600,732.6 | 6,164,204.8 |
| Regulating Services | Drinking water | 1,006.0 | 652.0 | 14,608.7 | 34.2 | 1,835.2 | 1,483.6 | 6,375.4 | 25,995.1 |
| | Electricity | 98,204.7 | 5,740.6 | 37.4 | | | | | 103,982.7 |
| | Carbon sequestration | 78,926.5 | 15,123.5 | 1,351.3 | 7,249.0 | 36,178.9 | 98.1 | 37,687.3 | 176,614.7 |
| | External Biodiversity Payment | 216,185.9 | 60,358.6 | 7,866.7 | 8,614.6 | 41,797.6 | 9,861.4 | 47,663.5 | 392,348.4 |
| | Total | 394,323.2 | 81,874.7 | 23,864.1 | 15,897.8 | 79,811.7 | 11,443.1 | 91,726.2 | 698,940.9 |
| Supporting Services | Agriculture value addition | 152,194.1 | 304,534.2 | 147,074.8 | 45,493.4 | 15,417.6 | 24,133.0 | 804,097.2 | 1,492,944.4 |
| | Livestock value addition | 216,964.2 | 3,316,876.8 | 538,736.8 | 22,328.1 | 1,189,976.0 | 1,124,024.4 | 6,506,043.9 | 12,914,950.2 |
| | Total | 369,158.3 | 3,621,410.9 | 685,811.6 | 67,821.6 | 1,205,393.6 | 1,148,157.4 | 7,310,141.2 | 14,407,894.6 |

*Source:* Field Survey, 2017

**ANNEX-9**

**Per Hectare Value of Services Generated by PAs of Sampled area (in NRs. '000)**

| | | Annapurna | Langtang | Shivapuri Nagarjun | Rara | Bardia | Koshi | Chitwan | Total |
|---|---|---|---|---|---|---|---|---|---|
| Provisioning services | | 1.9 | 1.7 | 72.9 | 3.6 | 0.9 | 13.0 | 42.2 | 136.2 |
| Cultural Services | Fees and permits | 0.2 | 0.1 | 0.6 | 0.0 | 0.2 | 0.1 | 0.7 | 1.8 |
| | Hotels and other | 1.7 | 0.1 | 40.4 | 0.1 | 0.2 | 0.5 | 3.7 | 46.7 |
| | Other tourism services | 0.1 | 1.2 | 1.1 | - | 1.0 | 0.4 | 3.2 | 7.0 |
| | Transport | 1.5 | 0.1 | 1.0 | 0.7 | 0.4 | 1.4 | 1.9 | 7.0 |
| | Total | 3.5 | 1.5 | 43.1 | 0.9 | 1.7 | 2.3 | 9.5 | 62.6 |
| Regulating Services | Drinking water | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 |
| | Electricity | 0.1 | 0.0 | 0.0 | - | - | - | - | 0.2 |
| | Carbon sequestration | 0.1 | 0.1 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2 | 0.9 |
| | External Biodiversity Payment | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 2.0 |
| | Total | 0.5 | 0.4 | 0.9 | 0.5 | 0.5 | 0.3 | 0.5 | 3.7 |
| Supporting Services | Agriculture value addition | 0.2 | 1.4 | 5.3 | 1.5 | 0.1 | 0.7 | 4.8 | 14.0 |
| | Livestock value addition | 0.3 | 15.6 | 19.4 | 0.7 | 8.1 | 32.3 | 38.7 | 115.0 |
| | Total | 0.5 | 17.0 | 24.7 | 2.2 | 8.2 | 33.0 | 43.5 | 129.0 |

*Source:* Field Survey, 2017

**ANNEX-10**

**Total Values of Services Generated by PAs of Nepal (Amount in NRs. '000)**

| | | |
|---|---|---|
| Provisioning services | | 19,108,121.81 |
| Cultural Services | Fees and permits | 466,470.61 |
| | Hotels and other | 3,997,365.20 |
| | Other tourism services | 1,229,683.50 |
| | Transport | 2,123,712.32 |
| | Total | 7,817,231.63 |
| Regulating Services | Drinking water | 45,323.95 |
| | Electricity | 103,982.73 |
| | Carbon sequestration | 456,699.20 |
| | External Biodiversity Payment | 975,365.69 |
| | Total | 1,581,371.58 |
| Supporting Services | Agriculture value addition | 2,499,818.24 |
| | Livestock value addition | 21,077,527.11 |
| | Total | 23,577,345.35 |

*Source:* Field Survey, 2017

**ANNEX-11**

## Contribution of PAs to Gross Domestic Product (without the Value of Carbon Sequestration)

| Sectors | Amount in' 000 | Amount in ten million | Percent of GDP | Percent of Total value of PAs |
|---|---|---|---|---|
| **Agriculture and Forestry** | **43,660,832.86** | **4,366.08** | **1.94** | **84.57** |
| **(i) Agriculture** | **23,577,345.35** | **2,357.73** | **1.05** | **45.67** |
| Crop production | 2,499,818.24 | 249.98 | 0.11 | 4.84 |
| Livestock value | 21,077,527.11 | 2,107.75 | 0.94 | 40.83 |
| **(ii) Forestry** | **20,083,487.50** | **2,008.35** | **0.89** | **38.90** |
| Timber | 1,679,880.79 | 167.99 | 0.07 | 3.25 |
| Firewood | 6,483,667.96 | 648.37 | 0.29 | 12.56 |
| Foddergrass | 3,885,992.00 | 388.60 | 0.17 | 7.53 |
| Leaf-litter | 1,274,864.77 | 127.49 | 0.06 | 2.47 |
| Wildfruit | 3,999.98 | 0.40 | 0.00 | 0.01 |
| Wild vegetable | 4,500,230.86 | 450.02 | 0.20 | 8.72 |
| Lokta | 723.21 | 0.07 | 0.00 | 0.00 |
| Allo | 1,475.36 | 0.15 | 0.00 | 0.00 |
| Fish | 107,370.72 | 10.74 | 0.00 | 0.21 |
| Honey | 362,800.12 | 36.28 | 0.02 | 0.70 |
| Thatching grass | 184,699.15 | 18.47 | 0.01 | 0.36 |
| Building material | 107,921.55 | 10.79 | 0.00 | 0.21 |
| Sand Boulder | 166,959.20 | 16.70 | 0.01 | 0.32 |
| clay mud | 61,175.25 | 6.12 | 0.00 | 0.12 |
| NTFP | 286,360.89 | 28.64 | 0.01 | 0.55 |
| External Biodiversity Payment | 975,365.69 | 97.54 | 0.04 | 1.89 |
| **Electricity, gas and water** | **149,306.69** | **14.93** | **0.01** | **0.29** |
| Drinking water | 45,323.95 | 4.53 | 0.00 | 0.09 |
| Electricity | 103,982.73 | 10.40 | 0.00 | 0.20 |

| | | | | |
|---|---|---|---|---|
| **Hotels and restaurants** | **5,693,519.31** | **569.35** | **0.25** | **11.03** |
| Hotels | 3,997,365.20 | 399.74 | 0.18 | 7.74 |
| Other Tourism services | 1,229,683.50 | 122.97 | 0.05 | 2.38 |
| Fee + Permits | 466,470.61 | 46.65 | 0.02 | 0.90 |
| **Transport, storage and communications** | **2,123,712.32** | **212.37** | **0.09** | **4.11** |
| Transport | 2,123,712.32 | 212.37 | 0.09 | 4.11 |
| **Total** | **51,627,371.17** | **5,162.74** | **2.30** | **100.00** |
| **GDP** | | **224,869.10** | | |
| **Contribution of PAs** | | **2.30** | | |

*Source:* Field Survey, 2017

**ANNEX-12**

## Contribution of PAs to Gross Domestic Product (with the Value of Carbon Sequestration)

| Sectors | Amount in' 000 | Amount in ten million | Percent of GDP | Percent of Total value of PAs |
|---|---|---|---|---|
| **Agriculture and Forestry** | **44,117,532.06** | **4,411.75** | **1.96** | **84.70** |
| **(i) Agriculture** | **23,577,345.35** | **2,357.73** | **1.05** | **45.27** |
| Crop production | 2,499,818.24 | 249.98 | 0.11 | 4.80 |
| Livestock value | 21,077,527.11 | 2,107.75 | 0.94 | 40.47 |
| **(ii) Forestry** | **20,540,186.71** | **2,054.02** | **0.91** | **39.44** |
| Timber | 1,679,880.79 | 167.99 | 0.07 | 3.23 |
| Firewood | 6,483,667.96 | 648.37 | 0.29 | 12.45 |
| Foddergrass | 3,885,992.00 | 388.60 | 0.17 | 7.46 |
| Leaf-litter | 1,274,864.77 | 127.49 | 0.06 | 2.45 |
| Wildfruit | 3,999.98 | 0.40 | 0.00 | 0.01 |
| Wild vegetable | 4,500,230.86 | 450.02 | 0.20 | 8.64 |
| Lokta | 723.21 | 0.07 | 0.00 | 0.00 |
| Allo | 1,475.36 | 0.15 | 0.00 | 0.00 |
| Fish | 107,370.72 | 10.74 | 0.00 | 0.21 |
| Honey | 362,800.12 | 36.28 | 0.02 | 0.70 |
| Thatching grass | 184,699.15 | 18.47 | 0.01 | 0.35 |
| Building material | 107,921.55 | 10.79 | 0.00 | 0.21 |
| Sand Boulder | 166,959.20 | 16.70 | 0.01 | 0.32 |
| clay mud | 61,175.25 | 6.12 | 0.00 | 0.12 |
| NTFP | 286,360.89 | 28.64 | 0.01 | 0.55 |
| Carbon Sequestration | 456,699.20 | 45.67 | 0.02 | 0.88 |
| External Biodiversity Payment | 975,365.69 | 97.54 | 0.04 | 1.87 |
| **Electricity, gas and water** | **149,306.69** | **14.93** | **0.01** | **0.29** |
| Drinking water | 45,323.95 | 4.53 | 0.00 | 0.09 |

| | | | | |
|---|---|---|---|---|
| Electricity | 103,982.73 | 10.40 | 0.00 | 0.20 |
| **Hotels and restaurants** | **5,693,519.31** | **569.35** | **0.25** | **10.93** |
| Hotels | 3,997,365.20 | 399.74 | 0.18 | 7.67 |
| Other Tourism services | 1,229,683.50 | 122.97 | 0.05 | 2.36 |
| Fee + Permits | 466,470.61 | 46.65 | 0.02 | 0.90 |
| **Transport, storage and communications** | **2,123,712.32** | **212.37** | **0.09** | **4.08** |
| Transport | 2,123,712.32 | 212.37 | 0.09 | 4.08 |
| **Total** | **52,084,070.37** | **5,208.41** | **2.32** | **100.00** |
| **GDP** | | **224,869.10** | | |
| **Contribution of PAs** | | **2.32** | | |

*Source:* Field Survey, 2017

**ANNEX-13**

## Questionnaire for NP/WR/CA Main Office

Basic Information

A. Warden's name:……. Contact. No……
Information Officer's name……..…… Contact

1. Detailed information of PA and Buffer zone

| S.NO. | Particulars | Figures | | |
|---|---|---|---|---|
| | | NP/WR/CA | Buffer zone | Total |
| 1. | Total number of Households within | | | |
| 2. | Total Forest Area (hectares) | | | |
| 3. | Total Forest Area in (hectares) | | | |
| 4. | Total shrub land | | | |
| 5. | Total pasture land | | | |
| 6. | Total area of water body | | | |
| 7. | Total snow covered land area | | | |
| 8. | Total wasteland without vegetation | | | |
| 9. | Total agricultural land area | | | |
| 10. | | | | |
| 11. | | | | |

Important note: If exact figures are not available, record the percentage figures for areas. Take help of the NP/WR/CA map available at NP/WR/CA for discussion if exact figures are not available.

2. Main community clusters around NP/WR/CA

| S.No. | Community Cluster name | Household distribution in figure or percentage out of total households | Name of NP/ WR/ CA Office's contact person | Contact persons mobile number |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| 9. | | | | |

3. Main recreational clusters (Tourist area) around NP/WR/CA

| S.No. | Recreational cluster name | percentage distribution by tourist visit priority | Name of NP/WR/CA Office's contact person | Contact persons mobile number |
|---|---|---|---|---|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |

Total may be more than 100 percent due to double counting.

4. Questionnaire for national Parks/Wildlife reserves/ Conservation area for fiscal year 2072/73

| Description | Figures | Remarks |
|---|---|---|
| Total tourist arrival | | Foreigners…Nepalese…… |
| Income from NP/WR/CA | | |
| 1. Entry fee for persons | | |
| 2. Entry fee for vehicles | | |
| 3. Collection permits | | |
| 4. Royalties | | |
| 5. Fine and penalties | | |
| 6. Fees for research activities | | |
| 7. Fees from other entertainment activities | | |
| 8. Others: specify……. | | |
| 9. …….. | | |
| 10. …….. | | |
| 11. …….. | | |
| Total income by NP/WR/CA | | |

Important note: Bring total income as reported by the NP/WR/CA office. Bring hard copy and soft copy of the report to Kathmandu.

5. Income by Buffer zone management and expenditures by NP/WR/CA

| Description | Figures | Remarks |
|---|---|---|
| Income from Buffer Zone management | | |
| 1. Entrance fee for tourist | | |
| 2. Entrance fee from vehicle | | |
| 3. Other fees specify…… | | |
| 4. …….. | | |
| 5. ……. | | |
| Total income by buffer zone | | |
| | | |
| Expenditures by NP/WR/CA | | |
| 1. Compensations paid for loss of life | | |
| 2. Compensations paid for human injury | | |
| 3. Compensations paid for livestock loss | | |
| 4. Compensations paid for loss of crops | | |
| 5. Compensation for stored grains | | |
| 6. Compensation for damaged house/sheds | | |
| Expenditures made as inputs for production(to be collected from annual report in Kathmandu) | | |

B. Instrument for collecting information on Environment Conservation

1. Change in the status of major Animal Species in the NP/WR/CA in the last 5 years.

| S.No | Species name | Status (declining, constant, improving) indicate by No change (↔) Improvement (↑) Decline (↓) | Remarks |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| 12. | | | |
| 13. | | | |
| 14. | | | |
| 15. | | | |
| 16. | | | |
| 17. | | | |
| 18. | | | |
| 19. | | | |
| 20. | | | |

2. Ecosystem Protection (change in the major ecosystem services during the last 5 years )

| S.N | Types of Ecosystem present in the NP/WR/CA | Status (declining, constant, improving) No change (↔) Improvement (↑) Decline (↓) | Remarks |
|---|---|---|---|
| 1. | Forest ecosystem | | |
| 2. | Rangeland ecosystem | | |
| 3. | Wetland ecosystem | | |
| 4. | Mountain ecosystem | | |
| 5. | Agro-ecosystem | | |
| 6. | | | |
| 7. | | | |

**ANNEX-14**

## FGD with Local Community

### A. Provisioning Services from the protected areas (NP/WLR/CA) and buffer Zone

1. Name of Protected Area (NP/WLR/CA) District: …… Date: ……..
2. Name of the sampled community: …… Address: …….
3. Total number of HHs in the sampled community:…….. …….

| Commodity | Units | No of collecting HHs | Average annual collections per HH from public land in NP/ WR/ CA and buffer zone | Annual collect from private land source | Approx. unit price* | Percent share from NP/WR/ CA | Percent share from Buffer zone** | Remarks (if any) |
|---|---|---|---|---|---|---|---|---|
| Timber | Cuft | | | | | | | |
| Firewood | Bhari | | | | | | | |
| Fodder-grass | Bhari | | | | | | | |
| Leaf-litter | Bhari | | | | | | | |
| Wild fruit tuber | kilo | | | | | | | |
| Wild Vegetable | kilo | | | | | | | |
| Medicinal plants | kilo | | | | | | | |
| Lokta and other raw material | bhari | | | | | | | |
| Allo and other knitting fibers | Bhari | | | | | | | |
| Fish and other edibles | kilo | | | | | | | |
| Honey | kilo | | | | | | | |
| Thatching grass | Bhari | | | | | | | |
| Building materials (such as reed) | Bhari | | | | | | | |
| Sand and boulder | Bhari | | | | | | | |
| Clay/mud for construction | Bhari | | | | | | | |
| …….. | | | | | | | | |

* The price of the product should be based on the prevailing local market price or on the basis of value of time taken for collection

** Verify the sum of inside PA and buffer zone should be 100 percent

**B. Agriculture: All figures in per household unit**

**1. Average Agriculture land of local household in the community:**
**Khet……Bari……Pakho……**

| Crop | Unit of measurement | Approximate quantity per household | Approx. price (last year) | Approx. value of product (qty*price) | Approx. purchased inputs | Average depredation percentage of the given cropped area | Average positive contribution of NP/WR/CA in percentage if any | Reason for such +ve contribution |
|---|---|---|---|---|---|---|---|---|
| Paddy | Quintal | | | | | | | |
| Maize | | | | | | | | |
| Wheat | | | | | | | | |
| Buckwheat | | | | | | | | |
| Barley | | | | | | | | |
| Potato | | | | | | | | |
| Cash crop | | | | | | | | |
| Vegetable | | | | | | | | |
| Other crops specify… | | | | | | | | |
| …….. | | | | | | | | |

Important note: the figures need not be whole numbers, use figures with decimal for most close estimates.

**2. Daily agricultural wage rate prevailing in community**

| Gender | Peak seasonal wage rate (per day) | Off season wage rate (per day) |
|---|---|---|
| Male | | |
| Female | | |

**3. Livestock income:**

| Crop | Number of livestock per household | Approx. value of product per year * | Approx. purchased feed per month | Approx. expd. in vet and other protective service (animal shed repairs) | Average positive contribution of NP/WR/CA to output in if any in percentage | Reason for such +ve contribution | Average negative contribution of NP/WR/CA to output if any in percentage | Reason for such -ve contribution |
|---|---|---|---|---|---|---|---|---|
| Milk animals: | | | | | | | | |
| Milk (cow, buffalo) | | | | | | | | |
| Meat animals: | | | | | | | | |
| Goat, sheep | | | | | | | | |
| Bull, buffalo | | | | | | | | |
| Chicken, duck | | | | | | | | |

Important note: the figures need not be whole numbers, use figures with decimals for best estimates.

* Approximate value of the product should be based on seasonal variation, Milk production should be estimated based on flush season and dry season. . Rough calculations can be done outside the box.

(6 flush months: ….. litres daily ; 6 lean months …….litres daily ; rate per litre Rs. ……)

Total value of milk = [(6*30*x) +(6*30*y)] *z

Value of meat products should include livestock consumed at home as well as livestock sold

Value of livestock sold last one year Rs…….. Value of livestock consumed last year Rs…….

Total value of meat produced = x + y

B. **Drinking Water supply**

| Description | Amount | Remarks |
|---|---|---|
| Number of households in the sample community | | |
| Percentage contribution to total water flow from NP/WR/CA water source | | |
| Parentage growth in water flow during dry season due to NP/WR/CA | | |
| Water price fixed by water management authority (per household and or per 1000 litre)(Rs) | | |
| Time taken for one fetching of water without conservation | | |
| Time taken for one fetching of water due to conservation | | |
| Number of water fetching per day by average household | | |

Water price at local level will be used for valuation of drinking water.

**ANNEX-15**

## FGD with Local Hotel Entrepreneur's Association Members

Name of NP/WR/CA…….Tourist Centre Name……Date……..

| Number of hotels | Average bed Capacity (pax) | Peak season | | Slack season | | Average expenditure per day by tourists (Rs.) | | Value of purchased inputs in Rs. * | Means of arrival in percent | | Air fare in Rs. | | Local transp, fare in Rs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of months | Occupancy rate | Number of months | Occupancy rate | Nepali | Foreigner | | Air | land | foreigner | Nepal | |
| | | | | | | | | | | | | | |

*Value of purchased items refers to items such as meat, liquor, milk purchased for preparing food for hotel guests; items such as soap, tissue paper used in room service

What is the percentage share of foreign tourist and Nepalese tourists out of total tourists visiting the NP/WR/CA?

Foreign tourist: …… percent.

Nepalese tourist: ……..…….percent

**Questionnaire for collecting information on other tourism related activities**

(FGD with hotel, home stay and other tourism service managers)

| S.No | Activities | Number of establishments | Peak season months | Peak season daily receipts | Slack season months | Slack season daily receipts | Value added percent | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1. | Homestays | | | | | | | |
| 2. | Restaurants | | | | | | | |
| 3. | Jeep safari | | | | | | | |
| 4. | Travel agency | | | | | | | |
| 5. | Tourist guides | | | | | | | |
| 6. | Elephant safari | | | | | | | |
| 7. | Massage and spa | | | | | | | |
| 8. | Curio goods shop | | | | | | | |
| 9. | …… | | | | | | | |
| 10. | …… | | | | | | | |
| 11. | …… | | | | | | | |
| 12. | …… | | | | | | | |

**ANNEX-16**

## International Conservation Fund

A. Bio diversity Services: International Conservation funds received by NP/WR/CA through government channel

| S.No. | Name of Donor Agency | Funding received in NRs | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
| 1. | | | | | | | |
| 2. | | | | | | | |
| 3. | | | | | | | |
| 4. | | | | | | | |
| 5. | | | | | | | |
| 6. | | | | | | | |
| 7. | | | | | | | |
| 8. | | | | | | | |
| 9. | | | | | | | |
| 10. | | | | | | | |
| 11. | Total | | | | | | |

B. Funds spent by international Conservation Agencies through their Nepal offices in NP/WR/CA (not through govt. channel)

| S.No. | Name of Donor Agency | Funding received in NRs | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
| 1) | | | | | | | |
| 2) | | | | | | | |
| 3) | | | | | | | |
| 4) | | | | | | | |
| 5) | | | | | | | |
| 6) | | | | | | | |
| 7) | | | | | | | |
| 8) | | | | | | | |
| 9) | | | | | | | |
| 10) | | | | | | | |
| 11) | Total | | | | | | |

**ANNEX-17**

## Meeting and Attendances

### Focus Group Discussion in Shivapuri Nagarjun National Park, Main Office

| S. No. | Name of Person | Organization | Designation | Contact Number |
|---|---|---|---|---|
| 1 | Kamal Jung Kunwar | Shivapuri_Nagarjun National Park | CEO | 9751070355 |
| 2 | Dhawa Tamang | Madhyabakri Upavokta samiti | | 9851063963 |
| 3 | Ramesh Dulal | Chapali Bishnu Upavokta samiti | | 9841876195 |
| 4 | Sanu Thakuri | Sivapuri Fedigaun | | 9849477175 |
| 5 | Jayaram Bhandari | Paani Muhan | | 9841792642 |
| 6 | Sushila Thakuri | Budhanilkantha | | 9841238766 |
| 7 | Bikash Shrestha | Basik samuha Tatha Madhyawoti | | 9841074429 |
| 8 | Rajendra Thapa | Kadeshwor Sikari | | 9841254377 |
| 9 | Krishna Bdr. Tamang | Chhap Tusal Samiti | | 9841238069 |
| 10 | Bishal Subedi | Green Era | | 9811235980 |
| 11 | Santosh Tamang | Madhyabakri Upavokta samiti | Office Assistant | 9840135147 |
| 12 | Suman Bhandari | Bishnu Chapali Upavokta Samiti | Office Assistant | 9841952768 |
| 13 | Raju Ghimire | Bishnu Chapali Upavokta Samiti | Sa.Se A. | 9849821300 |
| 14 | Anish K. C. | Shivapuri_Nagarjun National Park | Ranger | 9841742522 |
| 15 | Durga Chaudhary | Shivapuri_Nagarjun National Park | Ranger | 9845639610 |
| 16 | Deepa Bhandari | SNNP | | 9849876037 |
| 17 | Dr. Keshav Raj Kanel | RDC Nepal | | 9851078314 |
| 18 | Dr. Bishnu Prasad Sharma | RDC Nepal | | 9851031326 |
| 19 | Rameshwor Bhattarai | RDC Nepal | | 9851125330 |

**Community Level Focus Group Discussion in Kakani, Shivapuri Nagarjun NP**

| S. No. | Name Of Person | Organization | Contact No. |
|---|---|---|---|
| 1 | Sitaram Ghimire | K.O. Community | 9841419832 |
| 2 | Raju K. Lama | K.O. Community | 9841634535 |
| 3 | Netara Bdr. Tamang | K.O. Community | 9744057050 |
| 4 | Som Maya Lama | kakani Height community | 9851024660 |
| 5 | Sundar Shrestha | K.O. Community | 9851045519 |
| 6 | Virat Lama | | 9818469662 |
| 7 | Jiwan Lama | Ghamaila | 9860489005 |
| 8 | Rabindra Tamang | | 9823217540 |
| 9 | Sanukanchha Lama | | |
| 10 | Rajkumar Tamang | K.O. Community | 9851061440 |
| 11 | Binde Lama | | 9810372621 |
| 12 | Jitan Maharjan | Namaste Hotel | 9813060477 |
| 13 | Sushila tamang | K.O. Community | 9840515438 |
| 14 | Krishna Lama | Satkanya | 9849356449 |
| 15 | Lalittkumar Lama | Kakani | 9841612732 |
| 16 | Kumar Baskota | kakani khaja Ghar | 9841227457 |
| 17 | Bishnu Kumar Lama | | 9841612775 |
| 18 | Rajkumar lama | Kakani Garden | 9851245310 |
| 19 | Sivakumar Lama | | 9841684149 |
| 20 | Khombar Balami | | 9803322397 |
| 21 | Ramlal Lama | Lama Hotel | 9841872241 |
| 22 | Rabi Tamang | | 9851003058 |
| 23 | Shyam Lal Shrestha | K.O. Community | |
| 24 | Shyam Kumar Lama | Lama Hotel | 9851047894 |
| 25 | Sushila Manandhar | | |
| 26 | Rajan Gurung | | |
| 27 | Prem tamang | | |
| 28 | Chudamani Phuyal | | |
| 29 | Raj Kumar Shrestha | | |
| 30 | Santosh tamang | Kakani Okharpauwa | 9818123245 |
| 31 | Renuka Lama Rumba | Kakani Okharpauwa | 9860045762 |
| 32 | Bishnu Tamang | Shivapuri_Nagarjun National Park | 9864137816 |

**Community Level Focus Group Discussion in Mulkharka, Shivapuri_Nagarjun NP**

| S No | Name | Organization | Contact No. |
|---|---|---|---|
| 1 | Bishal Subedi | Green Era | 9811235980 |
| 2 | Anil Tamang | Sundarijal Mulkharka | 9841678878 |
| 3 | Suresh Gurung | Sundarijal | 9810078948 |
| 4 | Amar Lama | Sundarijal | 9803074220 |
| 5 | Ser Bahadur lama | Sundarijal | 9841659469 |
| 6 | Tirtha bdr Tamang | Sundarijal | 9803356019 |
| 7 | Nobiru sherpa | Sundarijal | 9810078935 |
| 8 | Suresh Paudel | Sundarijal | 9741283111 |
| 9 | Purna Shrestha | Sundarijal | 9841813976 |
| 10 | Satya Narayan | Sundarijal | 9841655991 |
| 11 | Narayan Shrestha | Sundarijal | 9849332676 |
| 12 | Bishnu Shrestha | Chisapani | 9813342424 |
| 13 | Jayaram Nepal | Mulkharka | 9841353990 |
| 14 | Gyan Raj Waiba | Sundarijal | 9823239149 |
| 15 | Tirtha Bdr. Tamang | Sundarijal | 9823046789 |

**Focus Group Discussion in Langtang National Park, Main Office**

| S. No | Name of Person | Organization | Designation | Contact No. |
|---|---|---|---|---|
| 1 | UbarajRegmi | LNP | Chief Conservation Officer | 9851014089 |
| 2 | Surya Khadka | LNP | Assistant Conservation Officer | 9802030071 |
| 3 | Ajeet Parajuli | LNP | Ranger | 9802039255 |
| 4 | Mikmar Tamang | DSCO Rasuwa | DSCO | 9844247091 |
| 5 | Ramesh Basnet | LNP | Ranger | 9860056160 |
| 6 | Vivek Kumar Ghimire | District Forest Office | Ranger | 9857036232 |
| 7 | Nitendra Kumar Singh | LNP | Ranger | 9802030062 |
| 8 | Til Kumari Adhikari | LNP | Na.Su. | 9849323860 |
| 9 | Rameshwar Bhattarai | RDC-Nepal | Biodiversity expert | 9851125330 |
| 10 | Sanjeeb Luintel | RDC-Nepal | Researcher | 9849418488 |
| 11 | Shobha Khadka | RDC-Nepal | Researcher | |
| 12 | Khamshung Tamang | National Park | Game Scout | |

**Community Level Focus Group Discussion in Thulosyapru, Langtang NP**

| S. No. | Name of Person | Organization | Contact No |
|---|---|---|---|
| 1 | Subba Lama | Hotel | 10670047 |
| 2 | Chhatra Bdr. Tamang | Cheese Factry | 9741046632 |
| 3 | Nurpu Sonam Tamang | yak Farm | 9841889363 |
| 4 | Laxman Khadka | Security | 9841683133 |
| 5 | Rajendra B. K. | Security | 9741521576 |
| 6 | Keshav Dev Bal | Security | 9868072368 |
| 7 | Furba Dindup Tamang | yak Farm | |
| 8 | Bibi Rani Tamang | yak Farm | |
| 9 | Nima Devi Tamang | yak Farm | |
| 10 | Pema Dorje Tamang | Thulo Shyapru | |
| 11 | Urken Tasi Tamang | Thulo Shyapru | 9841541230 |
| 12 | Rameshwar Bhattarai | RDC- Nepal | 9851125330 |

**Focus Group Discussion in Bardia National Park Main Office**

| S. No. | Name of person | Organization | Designation | Contact no. |
|---|---|---|---|---|
| 1 | Ashok Bhandari | BNP | A.C.O | 9858080002 |
| 2 | R. K. Thapa | BNP | CEO | 9858080001 |
| 3 | N. Kandel | BNP | BZO | 9858080003 |
| 4 | B. V. Dhakal | BNP | ACO | 9848239772 |
| 5 | Nirmal Kumar Chaudhary | BNP | | 9845168413 |
| 6 | Motiram Poudel | BNP | | 9845168413 |
| 7 | Badri Binod Dhakal | BNP | | 985808003 |

**Community Level Focus Group Discussion in Bethani, Thakubaba, Bardia NP**

| S. N. | Name of person | Address | Position |
|---|---|---|---|
| 1 | Gajendra Bahadur Thapa | Thakurbaba-2 | Staff |
| 2 | Dinesh Rijal | Thakurbaba-2 | Staff |
| 3 | Harka Thapa | Thakurbaba-2 | Businessman |
| 4 | Laxmikanta Neupane | Thakurbaba-2 | Businessman |
| 5 | Shanker Shahi | Thakurbaba-2 | Farmer |
| 6 | Tikaram Acharya | Thakurbaba-2 | Farmer |
| 7 | Dampa Neupane | Thakurbaba-2 | Social worker |
| 8 | Nara Bdr. Thapa | Thakurbaba-2 | Hotel Owner |
| 9 | Narayan Neupane | Thakurbaba-2 | Hotel Owner |

**Hotel Level Focus Group Discussion in Bethani, Thakubaba, Bardia NP**

| S.N. | Name of Person | Organization | Designation | Contact No. |
|---|---|---|---|---|
| 1 | Durga Poudel | Bardia Tiger Resort | Owner | 9858040202 |
| 2 | Binaya Chaudhary | Bardia Tiger Resort | Tourist Guide | |
| 3 | Bicki Chaudhary | Thakurbaba | Worker | |
| 4 | Tilak B. K. | Thakurbaba | Farmer | 9869063090 |
| 5 | Indra | Thakurbaba | Job Holder | 9848297738 |
| 6 | Naresh Chaudhary | Thakurbaba | Farmer | 9868257620 |
| 7 | Ganesh Chaudhary | Thakurbaba | Farmer | 9866849265 |
| 8 | Man Bdr Chaudhary | Thakurbaba | Farmer | 9864901060 |
| 9 | Salik Ram KC | Thakurbaba | Farmer | 9860391714 |
| 10 | Tulsi Tharu | Thakurbaba | Farmer | 9868255897 |
| 11 | Laxman Sunar | Thakurbaba | Farmer | 9868257800 |
| 12 | Raj Bdr Thapa | Thakurbaba | Farmer | |
| 13 | Dhan Bdr. Chaudhary | Thakurbaba | Farmer | 9866573640 |

**Focus Group Discussion in Rara National Park, Main Office**

| S. N. | Name of person | Organization | Designation | Contact no. |
|---|---|---|---|---|
| 1 | Chandra Shekhar Chaudhary | R. N. P. | Chief Conservation Officer | 9855050262 |
| 2 | Keshav Kanel | R.D.C. Nepal | | 9857078314 |
| 3 | Lokendra Adhikari | R. N. P. | Assistant Conservation Officer | 9849378823 |
| 4 | Bibek Shrestha | R. N. P. | Ranger | 9843084108 |
| 5 | Dharmendra Budha thapa | R. N. P. | Ranger | 9848335549 |
| 6 | Laxmi Dhital | R. N. P. | Ranger | 9843063737 |
| 7 | Laxmi Narayan Shah | R. N. P. | Ranger | 9844241971 |
| 8 | Yagya Raj Rokaya | R. N. P. | Ranger | 9846233761 |
| 9 | Sur Bdr. Dangi | R. N. P. | Accountant | 9858035350 |
| 10 | Man Bdr. Thapa | R. N. P. | Kharidar | 9844891311 |
| 11 | Ganesh Sedhai | R.D.C. Nepal | Consultant | 9841032660 |
| 12 | Birkha Bdr Rokaya | BZUC, RN | Member | 9848317900 |

**Community Level Focus Group Discussion in Murma, Rara NP**

| S. No. | Name Of Person | Organization | Designation | Contact No |
|---|---|---|---|---|
| 1 | Birkha Bdr Rokaya | Rajakot Mu. U Sa. | President | 9858320182 |
| 2 | Balkrishna Rokaya | Rajakot Mu. U Sa. | Ex-President | |
| 3 | Mani Chandra Rokaya | Rara Mp. | Ward President | 9848314635 |
| 4 | Nanda sen Rokaya | Nepal Rastrita ma Vi. | Teacher | 9858322896 |
| 5 | Rudra Rokaya | | | |
| 6 | Prakash Rokaya | | | |
| 7 | Rana bir Reokaya | | | |
| 8 | Maura Rokaya | | | |
| 9 | Singha Budha | Chhya Rara mp. | Ward Member | |
| 10 | Chhekala Bk | Chhya Rara mp. | Ward Member | |
| 11 | Bache Rokaya | Chhya Rara mp. | Farmer | |
| 12 | Basanta Rokaya | | Member | |

**Community Level Focus Group Discussion in Talcha, Rara National Park**

| S. No. | Name Of Person | Organization | Designation | Contact No |
|---|---|---|---|---|
| 1 | Gorkha bdr. Rawal | Farmer | | 9748905682 |
| 2 | Makkaa rawal | Farmer | | 9748911731 |
| 3 | Prem Rawal | Hotel | | 9748904293 |
| 4 | Tanikala Rawal | Hotel | | 9748911977 |
| 5 | Hari bdr. Rawal | R N P | Game Scout | 9748064494 |

**Community Level Focus Group Discussion in Ghandruk, Annapurna CA**

| S. No. | Name of person | Organization | Designation | Contact no. |
|---|---|---|---|---|
| 1 | Man Prasad Gurung | | President | 9846028013 |
| 2 | Sanjip Gurung | | | 9846100000 |
| 3 | Jasoda Gurung | Aama Samuha | Member | |
| 4 | Rabita Gurung | Aama Samuha | Member | 9846147930 |
| 5 | Ram Kumari Gurung | Aama Samuha | Member | |
| 6 | Jau Maya Gurung | Local | | 9827164885 |
| 7 | Harka Bahadur Gurung | Local | | |
| 8 | Kamala Gurung | Aama Samuha | Chairman | 9846069203 |
| 9 | Man Kumari Gurung | | | 9805843455 |
| 10 | Radha Gurung | | | 9827155403 |
| 11 | Dil Kumari Sharma | Aama Samuha | Member | 9818552168 |
| 12 | Sushma Gurung | | | 9846399146 |
| 13 | Santa Kumari Gurung | | | 9840010638 |
| 14 | Kisam Gurung | Hotel Entrepreneur | | 9856025222 |
| 15 | Subash Chandra Gurung | | | 9846210615 |

**Community Level Focus Group Discussion in Sikles, Annapurna CA**

| S. No. | Name Of Participants | Sex | Age | Contact No |
|---|---|---|---|---|
| 1 | Indra Jit Gurung | Male | 60 | 9816116565 |
| 2 | Narayan Gurung | Male | 64 | 9846318148 |
| 3 | Kul Pd. Gurung | Male | 55 | 9856021537 |
| 4 | Ratan Singh Gurung | Male | 64 | 9806603181 |
| 5 | Nau Maya Gurung | Female | 56 | 9846290323 |
| 6 | Bhadra Singh Gurung | Male | 81 | 9819194965 |
| 7 | Santosh Gurung | Male | 50 | 9846258211 |
| 8 | Khadga bdr. Gurung | Male | 44 | 984623246 |
| 9 | Dhana Bdr. Gurung (Maila) | Male | 37 | 9846222487 |
| 10 | Tau Gurung | Male | 47 | 9819129301 |

**Community Level Focus Group Discussion in Bhujung, Annapurna CA**

| S.N. | Name of person | Organization | Designation | Contact No. |
|---|---|---|---|---|
| 1 | Dil Bdr. Gurung | | | 9856045842 |
| 2 | Shree Bdr. Gurung | | | 98646496921 |
| 3 | Baniya Gurung | | | |
| 4 | Suk Bdr. Gurung | | | 9806515665 |
| 5 | Narayan Gurung | | Social worker | 9846358662 |
| 6 | Chun Kumari Gurung | | Homestay-1 | 9846709972 |
| 7 | Ram Kumari Gurung | | Homestay-2 | 9846709709 |
| 8 | Ash Kumari Gurung | | Homestay-3 | 9846709815 |
| 9 | Dhan Kashi Gurung | | Homestay-4 | 9846709801 |
| 10 | Indra maya Gurung | | Homestay-5 | 9846709955 |

**Community Level Focus Group Discussion in Maduban, Koshi Tappu WR**

| S. N. | Name of Person | Organization | Designation | Contact No. |
|---|---|---|---|---|
| 1 | Balham Majhi | Maduban | Member | 9862352833 |
| 2 | Devi Pd. Chaulagain | Maduban | Member | 9842233455 |
| 3 | Dilli Pd. Bastola | Maduban | Member | 9842263692 |
| 4 | Alou maya Bastola | Maduban | Member | 9824385733 |
| 5 | Ishwari Parajuli | Maduban | Member | |
| 6 | Devi Lamsal | Maduban | Member | |
| 7 | Durga Parajuli | Maduban | Member | 9862352795 |
| 8 | Sarada Khatiwada | Maduban | Member | 9807341122 |
| 9 | Jamuna Chaulagain | Maduban | Member | 9842241134 |
| 10 | Ambika Khatiwada | Maduban | Member | 9842223791 |

**Community Level Focus Group Discussion in Haripur, Koshi Tappu WR**

| S. N. | Name of Person | Organization | Designation | Contact No. |
|---|---|---|---|---|
| 1 | Durga Shankar Jha | | | 9814757572 |
| 2 | Hari Krishna Yadav | | | 9819398900 |
| 3 | Chandri Devi Mahato | | | |
| 4 | Jaleswari Devi | | | |
| 5 | Hom Bdr. Karn | | | |

**Focus Group Discussion in Chitwan National Park, Main Office**

| S.N | Name | Organization | Designation | Contact number |
|---|---|---|---|---|
| 1 | Ram C. Kandel | CNP | Chief Warden | 9855054234 |
| 2 | Nurendra Aryal | CNP | Asst. Warden | 9857030522 |
| 3 | Umesh paudel | NTNC, BCC | Conservation officer | 9846264724 |
| 4 | Kina KC | CNP | Ranger | 9851176693 |
| 5 | Amar singh Dhami | RDC | Program co-ordinator | 9843626891 |
| 6 | Narayan Sapkota | BZ. Panchpandav UC | Chairperson | 9855046587 |
| 7 | Chatra Khadka | CNP | Ranger | 9846347983 |
| 8 | Durga Prasad Joshi | RDC | Program Officer | 9848772514 |
| 9 | Prakash Limbu | CNP | Ranger | 9855052639 |

**Community Level Focus Group Discussion in Sauraha, Chitwan NP**

| S.N | Name | Organization | Designation | Contact number |
|---|---|---|---|---|
| 1 | Bp Chaudhary | Bagmara CF | President | 9855066104 |
| 2 | Suman Ghimire | Hotel Association | President | 9851008399 |
| 3 | Umesh paudel | NTNC, BCC | Conservation officer | 9846264724 |
| 4 | Kapil Subedi | Bagmara | User | |
| 5 | Indrawati Chaudhary | Bagmara | User | |
| 6 | Netra gurung | Bagmara | User | |
| 7 | Sushila Chaudhary | Bagmara | User | |
| 8 | Durga Prasad Joshi | RDC | Program Officer | 9848772514 |
| 9 | Dhurba Giri | Sapana Hotel | Owner | |

**Community Level Focus Group Discussion in Amaltari, Chitwan NP**

| S.N | Name | Organization | Designation | Contact number |
|---|---|---|---|---|
| 1 | Gyan bdr bote | Bamboo hotel | Owner | 9847095988 |
| 2 | Dhaniram gurau | Amaltari Homestay | Manager | 9867224300 |
| 3 | Umesh paudel | NTNC, BCC | Conservation officer | 9846264724 |
| 4 | Shiva Chaudhary | Amaltari homestay | Member | 9813114652 |
| 5 | Hariram gurau | Amaltari homestay | Member | |
| 6 | Rajesh Chaudhary | Amaltari | Member | |
| 7 | Shanta bote | Amaltari | Member | |
| 8 | Durga Prasad Joshi | RDC | Program Officer | 9848772514 |

**Attendance of Orientation workshop, Anamnagar**

| S N | Name | Contact No | Email |
|---|---|---|---|
| 1 | Dr. Keshav Raj Kanel | 9851078314 | keshavkanel@gmail.com |
| 2 | Dr Bishnu Pd Sharma | 9851031326 | bisunita@gmail.com |
| 3 | Mr. Rameshwar Bhattarai | 9851125330 | rmsbhattarai@gmail.com |
| 4 | Mr. Roshan Karmacharya | 9841374295 | roshankarmacharya044@gmail.com |
| 5 | Nirajan Khadka | 9845164298 | nirajankhadka.nepal#@gmail.com |
| 6 | Bishal subedi | 9811235980 | biishaalsuubeedii@gmail.com |
| 7 | Durga Pd. Joshi | 9848772514 | durgjoshi1000@gmail.com |
| 8 | Kammman Singh Bogati | 9841691197 | bogatikamman@gmail.com |
| 9 | Prabin Gauri | 9860089115 | prabingauli54@yahoo.com |
| 10 | Sanjeev Luintel | 9849418488 | luintelsanjeev234@gmail.com |
| 11 | Shova Khadka | 9846860187 | shovakhadka@gmail.com |

# Photos

Fig. 1: Presentation of Inception Report

Fig. 2: Consultation Meeting, Shivapuri_Nagarjun National Park

Fig. 3: Field Level Discussion at Murma area of Rara

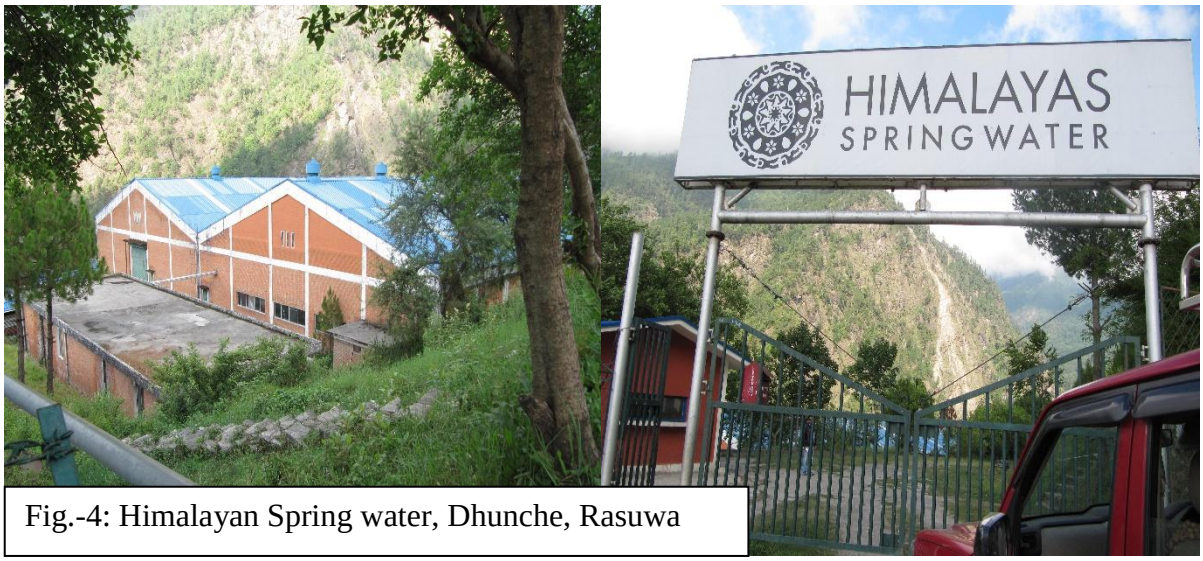


Fig.-4: Himalayan Spring water, Dhunche, Rasuwa

Fig.- 5: Group discussion at Siklesh, Annapurna Conservation Area

Fig.-5: Group discussion at Ghandruk, Annapurna


Fig.7: Dr. Bishnu Pd. Sharma, Presenting draft report

Fig.8: Draft Report presentation