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RESEARCH ARTICLE

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BIODIVERSITY CONSERVATION INITIATIVE IN NEPAL

Nar Bikram Thapa*¹

¹ Lumbini International Academy of Science and Technology - LIAST. Mahalaxmishan-Lalitpur, Nepal.

¹ <http://orcid.org/0000-0001-6441-2395>

Email: *nbthapa2012@gmail.com

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ABSTRACT

The study aims to assess the biodiversity conservation initiative in Nepal. The focus group discussion, score ranking, key informant interview, field observation methods were used to collect the information from the study areas. The study focused on Terai Arc landscape, National Conservation Areas and Sacred Himalayan Landscape of Nepal. In the areas around 5000 ha forests have been restored in different critical corridors and 1085 ha grassland had been managed across TAL which has supported in improving quality habitat for Tiger, its prey based species and other wildlife species. The overwhelming majority of the respondents (98.63%) have found happy with the programs because the improvement of sustainable livelihoods of the poor people, conservation of species and ecosystem conservation, sustainable forest management, alternative energy and conservation education and capacity building of women, men, youths, ethnic groups and conflict affected people. There has been increased species population like tiger, rhino, snow leopard, blue sheep etc; increased community stewardship, habitat restoration and livelihood enhancement. The program launched with government and civil society organizations that lead to sustainability of the program. There have been faced challenges in order to wildlife conservation that include human-wildlife conflict, limited resources, transboundary movement and wildlife trade etc.



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I. INTRODUCTION

I.1 BACKGROUND

Nepal is South Asian mountainous country in the lap of the Himalayas. Eighty five per cent of land area is classified as under mountainous and hills. Biodiversity is defined as the "variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes or which they are part; this includes diversity within species, between species and of ecosystems" [1]. UNEP (1995) has stated that the biological species are regularly explored along with scientific and technological innovations at the global level. The distribution and magnitude of the biodiversity that are explored today is a product of over 3.5 billion years of evolution, involving speciation, migration, and extinction which are largely affected by human influences in recent years. Recent estimates indicate the presence of various

biological species ranging from 7-20 millions, of which 1.75 million species are scientifically described [2].

Upreti (1998) has explained that Nepal has about 54% of the surface area under some sort of vegetation. A total of 118 ecosystems have been identified in different physiographic zones. In addition, 75 vegetation types and 35 forest types are identified which is bioclimatically, divided into ten zones. Besides the larger number of deep valleys, the considerable vertical extension of the Nepal Himalayas has contributed to the formation of many isolated localities, which may have favored for the creation of new species. Nepal contains only about 0.1% of total landmass of the world while it harbors about 2% of flowering plants, 3% of pteridophytes and 6% of bryophytes of the world's flora. In addition, about 5% (246 species) of the total flora reported is endemic to the country. The endemic species accounts to about 30 % for whole of the Himalayas. Based on the current level of species recorded, Nepal could be considered as a meeting point of several floral species because of altitudinal and climatic

variations [3]. Manandhar has pointed out that most Nepalese depend on plant resources for their livelihood. Traditionally, people of Nepal have considered forests as a source and a symbol of creation [4]. Thapa has stated that more than 134 wild edible plants have been identified in Nepal. The rural people have been taking roots, tubers, rhizomes, leaves, and fruits derived from wild sources during the food scarcity period [5]. The biodiversity conservation work is directly related to livelihoods of the indigenous people as well in Nepal.

MOFE has stated that even before the adoption of the United Nations Biological Convention (1992), the Forest Nationalization Act 1957 is one of the pioneer policies of its kind. This policy had an intention to protect the public forests from individual misuse and encroachment [6]. Dhakal has further elaborated that Nepal has formulated biodiversity conservation policy from local to central levels. The Constitution of Nepal gives an especial attention to all three tiers of the government to conserve, manage and use biodiversity resources as a concurrent subject matter. The National Parks and Wildlife Conservation Act (1973), Forest Act (1993), Environmental Protection Act (1994) and control of International Trade of Endangered Species of Wild Fauna and Flora Act (2017) and their subsequent regulations are the visible policy reforms for biodiversity conservation in Nepal [7]. However, biodiversity conservation practice from the community people is the age old tradition of Nepal.

Terai Arc Landscape (TAL), Sacred Himalayan Landscape (SHL) and National Conservation Priority Area (NCPA) programs have been launched in Nepal in order to conserve the biodiversity. TAL and SHL programs are being implemented by Department of National Parks and Wildlife Conservation (DNPWC) and Department of Forests (DOF) with technical and financial support from WWF-Nepal. The project is being run under co-management system between Government of Nepal and WWF as agreed by scope of cooperation between Ministry of Forest and Soil Conservation and WWF every five year. A total of 55 districts out of 77 were covered by the programs across the country. The intended beneficiaries include women; ethnic groups, Dalits, youths, and conflict affected people and vulnerable groups of the communities in the program areas.

1.2 BACKGROUND

The objectives of the study are to:

1. Assess the performance of the biodiversity conservation program to make difference in the lives of vulnerable population, and
2. Analyze the effectiveness and sustainability issues maintaining good relation with plants, people and wildlife towards biodiversity conservation.

II. MATERIALS AND METHODS

The participatory approaches and methods were adopted by involving the project stakeholders primarily the direct right holders in general using a combination of qualitative and quantitative tools for data collection. The gender equality and social inclusion was taken into account while carrying out the study. The focus group discussion, key informant interview, direct observation, score ranking methods and review of documents was adopted to collect the information. Similarly, project publications were reviewed as secondary source of information. The people's perception towards the programs as

stated in the plan have been figure out and conducted the comprehensive analysis from different perspective. A total of five districts were selected as sample purposively based on the ecological belt, representation from poor, women, ethnic groups, and conflict affected people from the study areas. The study has limitation due to sample survey. It could not cover the whole study areas due to large population and geographical coverage.

III. RESULTS AND DISCUSSIONS

III.1 EFFECTIVENESS AND IMPACT

The Terai Arc Landscape including Corridor and Bottleneck Restoration, Sacred Himalayan Landscape and National Conservation Program Area supported by WWF in the study areas. These programs have brought positive changes in the lives of women, men, children, ethnic groups, youths, and conflict affected people. In the study areas, TAL focused more on Rhino and Royal Bengal Tiger conservation whereas SHL has focused more on snow leopard and red panda conservation. They have been linked with sustainable lives and livelihoods of the local people particularly focusing to buffer zone area of national parks. More than 5000 ha forests have been restored in different critical corridors. Likewise, 1085 ha critical grassland had been managed across TAL which has supported in improving quality habitat for Tiger, its prey based species and other wildlife species.

III.1.1 Happiness Mapping Towards the Programs

When asked about the perceptions of local people towards biodiversity conservation program to overall performance, the respondents have been replied and scored 1,654 (70.38 %), 664 (28.25 %) and 32 (1.36 %) for very happy, happy and unhappy (poor) condition respectively. The large majority of the respondents (98.63 %) have rated very happy and happy with the programs because of the improvement of sustainable livelihoods of the poor people, conservation of species and ecosystem conservation, sustainable forest management, Climate Change Adaptation, alternative energy and conservation education and capacity building of women, men, youths, ethnic groups and conflict affected people. Few respondents (1.36 per cent) rated the program unhappy for not getting direct tangible benefits. The happiness mapping tool was used to map out the perceptions towards satisfaction of the people (Table 1). A total of 50 corn seeds assumed as 100 per cent were given to every respondent. A total of 47 persons participated in the exercise. The community perception was mapped out based on their direct observation, experience and best judgment of the respondents. This was measured in relative terms. The frequency represents the scoring of the respondents on set parameters.

Table 1: Happiness Mapping towards the Programs.

Parameters	Frequency	Percent
Very Happy	1654	70.38
Happy	664	28.25
Unhappy	32	1.36
Don't Know	00	00
No Response	00	00
Total score	2350	100

Source: Author, (2017).

The community perception mapped out during the study which is presented below:

"There has been conflict between wildlife and human-being particularly caused by wild boar, tiger, rhino, elephant and

deer species in our area. Chitwan National Park has provided 30-50 per cent amount of income to buffer zone community for the purpose of community development, conservation education, income generation program etc. In the last year, we have spent NPR 3.2 million including conflict resolution budget (NPR 2 million). We have done PCC wall construction, 10 KM road construction, received fund from GoN, Ministry of Finance (NPR 15 million) for 5,265 meter road construction. The mess wire PCC fencing has controlled about 100 per cent wild boar and 90 per cent rhino infestation into the private land. He further stressed that the relationship between wildlife and human-being will be improved if there is no damaged the crops by wildlife in private land" says Mr. T. N. Adhikari-40, Office Secretary, Buffer Zone Kerunga Forest Users Group, Chitwan National Park.

III.1.2 Before and Now Situation Mapping in Amaltari, Nawalparashi

The score ranking tool was used with the participation of Community based Anti-Poaching Unit in Baghkhori village of Amaltari BZUC, Nawalparasi in Chitwan National Park which included community women and men to measure the effectiveness of key program activities of TAL and NCPA in the communities (Table 2). When asked on before and now situation mapping, what were the changes observed in the community, the respondents scored the main impacts of program in plant, people and wildlife.

Table 2: Before and After Situation Mapping in Amaltari Community-based Anti-Poaching Unit.

Main Impacts	Before (August 2012)	Now (June 2017)	Reasons
1. Forest conservation	6 (60 %)	9 (90 %)	<ul style="list-style-type: none"> Increased conservation awareness Organized grassland Protection of wetland etc Increased community patrolling
2. Wildlife Population	3 (30%)	8 (80 %)	<ul style="list-style-type: none"> Increased no. of Rhino from 5-35 Increased no. of Tiger from 2-6 Increased no. of deer from 10-100 Observed new species of bird (Mottled wood Owl-a kind of <i>Latokosero</i>)
3. Life of Rivers (Narayani) around 6 KM distance	3 (30 %)	7 (70 %)	<ul style="list-style-type: none"> No use of insecticides in River Plastic free Organized collection of stone, gravel etc Controlled fishing
4. Interrelationship between Plant, Wildlife and Human-being	4 (40 %)	7 (70 %)	<ul style="list-style-type: none"> Increased Plantation Rescued of injured wildlife Zero poaching happened in this area Wildlife closed by with community

Source: Author, (2017).

The Amaltari, Nawalparashi Community based Anti-poaching Unit (CBAPU) was formed in 2014. There are a total of 300 members in the group where 40 per cent women and 60 per cent men have been organized. This is a volunteer value-led youth group. They are actively engaged in biodiversity conservation work in the buffer zone of Chitwan National Park. They have formed executive committee where a total of 15 members (40 % women and 60 % men) have been elected from the general members. They have own office building. They have done significant works in order to biodiversity conservation that include: Patrolling in day and night, Narayani River cleaning,

plantation, awareness rising to school children, conservation campaign, ecotourism etc. They have faced challenges as well that include direct conflict with wildlife. However, they became successful for zero poaching until eight years.

At the community level, the significant changes as perceived by respondents which are as follows:

- Development of self-reliant economy
- Economic prosperity happened among community members
- Diversification of enterprises
- Improved public health-health education, sanitation and personal hygiene
- Increased social harmony
- Reduced child and maternal mortality
- Increased self-esteem among women
- Developed local leadership and local institution
- Increased bargaining power among CBAPU members to influence policy and practice at local level.

III.2 SUSTAINABILITY

Sustainability is a major issue of the most of the development projects in Nepal due to high incidence of poverty, weak management capacity and poor governance system. In this program, the implementing partner organization Ministry of Forest and Soil Conservation, Department of Forests, Department of National Park and Wildlife Conservation and local civil society organizations has taken measures for the continuation of the Terai Arc landscape, Sacred Himalayan Landscape and National Conservation of Priority Area issues in the future. Furthermore, Nepal Army has been engaged using mobile-based technology (GPS), CC camera etc in 24 hour duty in order to promote and conserve the forest and wildlife particularly in TAL, SHL and NCPA programs.

Similarly, Forest Caretakers (Ban Heralu-women and men) are also engaged in conservation works using mobile based technology (Table 3). They have felt proud with getting limited incentives as well. There has been formed Buffer Zone Forest Committees, Buffer Zone Forest Users Groups, Eco-Clubs formation and Council level network in the program areas. Government of Nepal has provisioned the conservation of forest and wildlife in each priority areas. Similarly, Government has initiated number of long term programs particularly focusing to conserve the endangered species like Royal Bengal Tiger, Asian Rhinoceros, Asian Elephant, Snow leopard, Red Panda, River Dolphin, and Gharial etc. There has been developed the linkage, coordination and collaborative works with government line agencies and service providers for the continuation of the services as well.

Table 3: Before and now situation mapping of forest and wildlife in Chitwan National Park as perceived by Ban Heralu.

Parameters	Before (2012)	Now (2017)	Reasons
Control deforestation	4 (40 %)	7 (70 %)	Mobile based technology Dedication of <i>Ban Heralu</i>
Control wildlife poaching	5 (50 %)	9 (90 %)	Dedicated effort of Nepal Army People awareness Actively engagement of CBAPU Coordination between stakeholders
People's awareness raising	4 (40 %)	9 (90 %)	Conservation education Mobile based technology

Source: Author, (2017).

The researcher discussed with Ban Heralu to map out their contribution in biodiversity conservation which is presented below:

III.2.1 *Shramik Duna Tapari Small Industry*

The laborers have organized and established the NTFP based Duna Tapari cottage industry in Kawashoti, Nawalparasi district in 2015 and registered in Department of Small and Cottage Industry. A total of 700 members (540 women and 160 men) are organized in this cottage industry. It has reported the transaction of NPR 700,000.00 (seven hundred thousand, 1US\$ =117 NPR) in last year. We have planned to increase transaction around NPR 2,000,000.00 (NPR two million) in the next year. In this industry, a total of 278 people are directly employed where a woman earned net NPR 84,000 per year. They sell their products in Narayanghat, Pokhara and Kathmandu valley. This industry has been led by Mr. R. P. Pandey.

There have been changes observed in the life of members which are as follows:

- Children are enrolled in boarding school for education
- Leadership Development in politics as well as other social sector
- 12 months food security
- Constructed the RCC building as shelter
- Improved nutritional status of the poor people
- Improved secure livelihoods of the poor and vulnerable families
- Increased self-esteem among women and poor men due to self-employment generation.

"The program supported by WWF to establish NTFP based small industry has been instrumental in making a difference in the life of poor and vulnerable families. I am happy with this industry. I have earned NPR 450,000.00 last year. It has contributed a lot to run my livelihood. Now, I become an industrialist. My life has been transformed from landless laborer to industrialist. I am very proud from it. We have envisaged the future plans that include: extension of other NTFP based industry like broom grass, bamboo baskets, rope etc and increase direct self-employment for 700 people in the next year. However, we have needed NPR 1,000,000.00 (one million) and management training to expand our industry. We would like to request to WWF for further support in our plan" says Mr. Pandey, R. P. - 42 June 2017, chairperson, Jyoti Kunj Community Forestry, Kawashoti, Nawalparashi and leader of Shramik Duna Tapari Small industry, Kawashoti.

III.2.2 *Institutional Sustainability*

Poudel (2016) has pointed out that Nepal Army is now providing security to nine National Parks and 3 Wildlife Reserves deploying 7,627 military officers and personnel. Since April 2015, Nepal Army has also deployed its 849 personnel in Dhorpatan wildlife reserve and Makalu Barun National Park. Nepal Army has established Nature Protection Institute to further strengthen nature conservation work. Due to its vigilance, Nepal has been able to mark Zero Poaching Years in 2011, 1013 and 2015. Nepal Army has been playing a key role in protection of wildlife and natural heritage. Out of 20 protected areas, Nepal Army has been protecting 12 areas [8].

Nepal pioneered the use of Real-time SMART patrols in 83 guard posts in all tiger-bearing protected areas of TAL. This

new patrol techniques developed by the Nepal Army in collaboration with WWF Nepal makes use of an android-based platform on mobile devices through which patrol teams record and update patrolling and location data in real-time. It has allowed for 24-hour monitoring of patrol teams together with providing immediate instructions on the ground, made the patrolling teams accountable, increased area coverage and frequency, and provided for paperless and prompt reporting to the headquarters. This is the latest technology to curb poaching and aid enforcement efforts within protected areas [9].

The study team conducted key informant interview with Colonel Mr. Thapa about the effectiveness of Chitwan National park conservation work particularly supported by Nepal Army that was interesting and amazing work in order to conserve the forest and wildlife. "The main weapon is the self-discipline and unity of efforts for wildlife conservation. This is a team work. Nepal Army is doing 24 hour patrolling in order to anti-poaching operation. We are using mobile based technology developed by Nepal Army which is useful to monitoring the movement of army and others in any time and from any place. There have been faced challenges in order to wildlife conservation that include human-wildlife conflict, limited resources, transboundary movement and wildlife trade etc. There is a need of repair and maintenance of high tech equipments in the national park area" says Colonel Mr. M. Thapa, Nepal Army, Chitwan National Park, 2017.

The local institution is an engine of community development including biodiversity conservation to make a difference in the life of poor women and men. WWF has initiated a Digo Gaon (sustainable village) concept where an integrated program has been launched. This is a pilot project supported by TAL program. It has gained momentum in positive trend towards resilient livelihoods and biodiversity conservation as well.

Similarly, the study team has carried out the key informant interview with Chief Conservation Officer Mr. Kanel about the effectiveness of Chitwan National Park conservation work over the last five years. During the interview, he pointed out the critical views on the conservation work supported by WWF Nepal in Chitwan National Park. "There has been increased conservation of wildlife species and forest, reduced dependency, increased fencing work to improve relationship between wildlife and buffer zone community, initiated self-employment generation schemes, fishery, capacity building training, celebration of world wildlife day, community incentive programs, reduced incidence due to people-park program, wetland conservation etc. National Park has allocated 30-50 per cent income to buffer zone community development works. He has identified as gaps that WWF should fully follow the participatory planning process; Chitwan National Park should lead and own the planning process. All conservation programs should be launched through Chitwan National Park whereas WWF should work as facilitator" says Chief Conservation Officer, Chitwan National Park, 2017. There is co-management system existing between GoN and WWF in order to run the TAL, SHL and NCPA programs. There has been reported some coordination problem between CNP and TAL management team due to misunderstanding. It needs to be resolved through mutual respect and dialogical process between Chitwan National Park and WWF, TAL program.

III.2.3 *Baghkhori Sustainable Village Nawalparashi*

The score ranking tool was used with the participation of women and men of sustainable village in Baghkhori, Nawalparashi buffer zone of Chitwan National Park to measure

the impacts of sustainable village of TAL and NCPA at the buffer zone community level. When asked on before and now situation mapping regarding the changes observed in the community, the

respondents scored the main impacts of program in plant, people and wildlife using certain outcome indicators (Table 4).

Table 4: Impact on Baghkhori Sustainable Village, Nawalparashi, Chitwan National Park Buffer Zone.

Parameters	Before (Aug 2012)	Now (June 2017)	Reasons
1.Economic Development <ul style="list-style-type: none"> • Self employment • Formation of Cooperative • Ecotourism (Homestay) 	2 (20 %)	6 (60 %)	Ecotourism-75 HHs, skill development, diversification in agriculture, formation of cooperative-220 members, Increased economic prosperity and reduced poverty.
2.Social Development <ul style="list-style-type: none"> • School Education • Improved in Public Health • Access to Water, Sanitation and Hygiene • Good Governance and Culture 	2 (20 %)	7 (70 %)	Access to safe drinking water-100 % HHs, establishment of community health clinic, protection of culture, increased social harmony, organized public auditing and organized regular meeting.
3.Environmental Conservation <ul style="list-style-type: none"> • Forest, wildlife, Climate Change Adaptation, environmental Friendly behavior and zero poaching 	1 (10 %)	6 (60 %)	Zero-poaching until eight years, management of wetland and grassland, construction of forest trail, mess wire (5.5 KM area, Electric fence (8.5 KM area), plantation, established nursery, construction of checkdam and regular patrolling etc
4.Interrelationship between Plant, Wildlife and Human-being	3 (30 %)	8 (80 %)	Forest and wildlife conservation, and established good relationship between wildlife and human-being due to awareness rising among women and men.
5.Leadership Development/Local Institution Development	2 (20 %)	8 (80 %)	Developed local leadership Increased women awareness Increased self-esteem among the women.

Source: Author, (2017).

III.2.4 Issues and Challenges

Human-wildlife conflict continues to be a major challenge in TAL. While conservation efforts have helped increase wildlife populations especially of tigers and rhinos, this in turn has escalated the level of such conflict in TAL. The incidence of a rhino entering the streets of Hetauda bazaar is a vivid example of how HWC (human wildlife conflict) might escalate in the future if appropriate mitigation measures are not in place [9].

III.2.5 Technical Sustainability

The fish enterprises have becoming lucrative business for the people living in buffer zone areas (Box 1) particularly in Madi, Chitwan. A case study has been presented below:

Box 1: Fishery Enterprises

Similarly, the fishery enterprise seems to be profitable as compared to traditional crop like rice. It produces 200 kg fish per Katha that cost around NPR 50,000 (fifty thousand) whereas rice produces 150 Kg per Katha that cost NPR 3,000 (three thousand) only. The fishery enterprise has becoming popular in Gopalnagar, Madi, Chitwan where a total of 800 ponds are being used for fish culture. Farmers sell their products in Narayanghat, Pokhara and Kathmandu valley. There is no major problem of marketing. However, there has been problem noted in order to repair and maintenance of old ponds and control of magar gohi as predator. Farmers from Gopalnagar sell the fish around NPR 70 million per year where a total of 102 households have been engaged in fish farming (Fig.10). They have formed fish cooperative as well in order to promote the fish enterprises. After fish farming, there has been controlled 90 per cent wildlife infestation in the village. Government of Nepal, Ministry of Agriculture has declared Madi as pocket area of fish. So that farmer will get more support from Government of Nepal. The magar gohi should be translocated from Gopalnagar to Narayani River.

III.2.6 Financial Sustainability

The financial sustainability of the program and local institutions is crucial aspects for long lasting. In the project areas, there has been formed Buffer Zone Forest Users Groups, Buffer Zone Forest Users' Committees, agricultural cooperatives, saving & credit groups, commercial vegetable farming using plastic tunnel, livestock enterprises, poultry farming, dairy industries, NTFP based enterprises and ecotourism (homestay) program activities have been operated with the local leadership. The National Parks also allocated about 30-50 per cent income to buffer zone community development. The public hearing or public auditing events at Buffer Zone Forest Users groups and Buffer Zone Forest Users Committees organized in order to promote financial transparency and to control and prevention of misuse of resources. However, there is a need of capacity development of executive committee members in this.

III.3 COORDINATION AND COMPLIANCE

WWF Nepal works with community partner and government agencies from local to district and central levels in program planning, implementation and monitoring. Field project office has close coordination with DDC and other district level government agencies. WWF Nepal also intensively engaged at different central level mechanisms to work on policy formulation, national level coordination; and resource mobilization. WWF Nepal shares all the policy and research documents to the government agencies as well as other stakeholders. It has strong partnership with Ministry of Forests and Soil Conservation and its departments: Department of National Parks and Wildlife Conservation and Department of Forests. Government of Nepal and conservation partners work closely with technical expertise and financial resources to achieve the conservation results. WWF Nepal has followed the terms and conditions provisioned in the general agreement and project agreement made with SWC.

Project implementations has been done under co-management system where government representatives deputized as a project lead and play critical role in ensuring co-ordination with local level authorities and partners on the ground whereas central level project steering committee and project executive committee provides policy guidance and support with strategic direction in implementations. WWF has organized the transboundary meeting with China and India as well in order to solve the transboundary issues related to illegal trade of wildlife and fire control etc. China-Nepal Memorandum of Understanding (MOU) on cooperation in the field of forestry and biodiversity conservation (2010) is under implementation through the support of WWF particularly in organizing local level transboundary meetings. A local level transboundary meeting between China (Tibet Autonomous Region-TAR) and Nepal was organized on 25th April 2015 in Dhunche, Rasuwa, Nepal. The meeting delegates discussed about the cross-border conservation issues particularly forest fire and illegal wildlife trade in the border areas [9].

WWF (2014) has stated that an event of regional transboundary meeting between India (Sikkim) and Nepal organized on 17 February 2014 in Gangtok, India to enhance trans-boundary cooperation. The meeting decided to continue cross-border joint monitoring to identify and address conservation issues; and strengthen information and communication systems between the two countries to stop poaching and illegal trade of wildlife and plant parts. Snow leopard research in Nepal and red panda research in India was shared in the meeting and agreed to collaborative research on flagship species through common understanding on methodologies and information sharing [10].

III.4 GENDER EQUALITY AND SOCIAL INCLUSION (GESI)

The WWF set a broad GESI goal as: "By the end of 2018, WWF's all program and projects practice will be more gender and social responsive and inclusive," taking the first step towards making the program more responsive and inclusive. This broader impact will be constantly supported, enriched and achieved through constant feedback from field project implementation, peer engagement in the planning process, and incorporation of national policy with its contemporary context. These would accelerate positive changes in conservation practices, making them more gender and socially inclusive. The WWF team also aimed to develop a more comprehensive reference guideline; build CBOs' implementation capacity, enhance understanding on gender and conservation, and promote an enabling environment to achieve higher impact. WWF Nepal's future focus envisaged on building the capability of local natural resource management institutions by helping in their human resource Development and providing training and orientation to local resource persons, respective project staff, social mobilizers and implementing partners in the landscapes programs, and performing periodic social and gender auditing of all targeted activities [11].

The Forest users Groups, Buffer Zone Forest Users Committee and agriculture cooperatives are the backbone of the TAL, CBRP, SHL and NCPA programs. There has been changed in the traditional gender roles of men and women where women farmers participate in the community meeting whereas men go to jungle to fetch fuel wood and fodder. At present, this has been a normal phenomenon in the society. The gender issue has been taken into account in the assessment-design-implementation-monitoring of TAL and SHL programs.

In the study areas, the participation of women (around 55 per cent) in the development process has significantly increased particularly in decision-making process at households, community and municipality level. There has been narrowing down the gap in traditional gender roles and division of work in women and men. However, women have still more engaged in domestic chores whereas men have focused more in seasonal migration and plough the land. In case of access to and control over resources, women have also increasing greater influence within household and even in the community level resources due to the positive impacts of the conservation programs. The Buffer Zone Forest Users Groups and Buffer Zone Forest Committee have greater roles to increase women awareness and organizing in the groups. There has been significantly increased an articulating and bargaining power among the women to claim the rights with duty bearers particularly with Village Development Committees/municipalities and district line agencies. There has been comparatively reduced gender-based violence in the community due to organized women action against discrimination. The work load of the women has been reduced due to access to drinking water; grain mills, road transportation facility and increased gender awareness etc. However, the patriarchal social structure is still dominating in the society. The promoting gender equity and social inclusion in real sense is challenging work for civil society organizations at the community. There is a need of strong lobbying and advocacy work to influence policy, practice, ideas and beliefs at local and national level.

The migration of youth to foreign countries for employment has become a major demographic phenomenon, affecting local level resource management. According to the 2011 census, there were 474,022 absentee people from the TAL districts; Nawalparasi district has the highest absentee population (63,220) and Parsa has the lowest (7,376). Males represent the overwhelming majority of the absentee population, skewing the gender balance in these districts and the TAL as a whole. These factors have forced a change in gender roles, increasing the number of women-headed households and compelling women to take on a greater role in natural resource governance [12].

III.4.1 Before and Now Situation Mapping of Tal and NCPA Program

The score ranking tool was used with the participation of women and men of Buffer Zone Forest Users' Committee in Chitwan to measure the impacts of overall TAL and NCPA at the buffer zone community level. When asked on before and now situation mapping what was the changes observed in the community that the respondents scored the main impacts of programs in plant, people and wildlife using certain impact indicators (Table 5).

A total of 10 seeds of corn (assumed to be 100 per cent) were distributed to the leader of the committee to judge the changes observed in the area. The focus group discussion was conducted that included women and men members of sustainable village in the scoring exercise. Each group member was welcome to participate in the discussion before scoring. There has been overall positive trend happened over the period of time due to the interventions of TAL, SHL and NCPA programs in the buffer zone communities as whole. The overall performance of programs has been increased from 41 per cent to 75 per cent over the period of five years. However, 20 per cent (fifth quintile population) poor and vulnerable families still excluded from the

programs. This situation is similar in Sacred Himalayan Landscape as well as perceived by local people. This is the challenge for the implementing partners. The poverty alleviation is the challenging job for conservation workers. It needs to be

focused in the years to come. There is need of special programs and strategy in order to address the need and priorities of ultra poor and vulnerable groups of buffer zone communities [13].

Table 5: Before and Now Situation Mapping of the Biodiversity Conservation Programs.

Program Outputs	Before (August 2012)	Now (June 2017)	Reasons
Terai Arc Landscape			
Sustainable Forest Management	5 (50 %)	7 (70 %)	Plantation and mess wire fencing. Conservation education to community people. Active support of Community forestry Users group. Controlled grazing. Increased people awareness. Used of mobile based technology for monitoring. Distribution of improved cooking stoves. Increased use of gas for cooking purpose.
Species and Ecosystem Conservation	4 (40 %)	8 (80 %)	Increased no. of wildlife population due to increased real time monitoring using mobile based technology. Increased positive relationship between park and people due to buffer zone program interventions. Mobilization of youths Decreased wildlife poaching etc. Done corridor bottleneck restoration. Organized transboundary meeting between China and Nepal and Nepal and India.
Climate Change and Energy	3 (30 %)	7 (70 %)	Increased use of biogas and solar power Use of spring water for irrigation and drinking purpose. Increased pond water collection for irrigation.
Freshwater	3 (30 %)	8 (80 %)	River cleaning and protection of water source. Increased access to drinking water, sanitation and hygiene practice.
Churia Watershed Conservation	5 (50 %)	8 (80 %)	Controlled grazing and illegal logging harvesting. Increased awareness among the people to conserve Churia watershed.
Sustainable Livelihoods	5 (50 %)	8 (80 %)	Increased income of the buffer zone people due to NTFP based small enterprises, formation of agriculture cooperatives, ecotourism, commercial vegetable farming, fishery farming, dairy enterprises, skilled-based training etc.
Policy and Advocacy	3 (30 %)	5 (50 %)	Lobbying and advocacy works to protect national park and rights of the buffer zone community. Engaged in policy and strategies formulation with Government of Nepal and others. Local leadership development. Increased use of government budget by buffer zone people.
Planning, Monitoring and Development	4 (40 %)	8 (80 %)	Increased participatory planning and learning process.
Conservation Education and Capacity Building	4 (40 %)	8 (80 %)	Increased people's awareness through conservation education and capacity development of local institutions/cooperatives. Organized trainings and educational tour to local people.
Changes in lives of local People	5 (50 %)	8 (80 %)	Level of direct poverty and injustice among the poor people has been reduced because of integrated nature of program interventions, lobbying & advocacy works with Government of Nepal, political parties and donors.
Total Score	41	75	Satisfactory result
Average Score	4.1 (41 %)	7.5 (75 %)	Satisfactory performance observed

Source: Author, (2017).

Note:

Rating Score: satisfactory, 3-4 moderately satisfactory and 1-2 unsatisfactory.

Species Conservation:

Conservation of tiger, rhinoceros, gharial crocodile and vultures has a priority for interventions. Status and trends of major species are summarized below:

Tiger: A target to double the adult tiger population in TAL-Nepal by 2022 was set during this period as Nepal's commitment to the global tiger conservation goal. Between 2011 and 2014 the tiger numbers in TAL-Nepal protected areas increased by over 60%, to 198 adult animals, and Nepal is on track to achieve the 2022 target of at least 250 adult tigers managed in meta-populations in the landscape [14].

Rhinoceros: The rhino population increased to 645 animals in 2015 from a low of 372 in 2005 during a period of

intense poaching. Functionality of the Khata corridor is being confirmed by tracking movement of satellite-collared rhinos to India's Katarniaghat WS.

Gharial: Over 800 captive bred gharials have been released into the Narayani, Rapti, Karnali, Babai and Koshi River systems to augment wild populations. A survey in 2013 estimated the wild gharial population at 124 animals, which is a 21% increased since the previous count in 2008. Evidently most of the gharials released move downriver and across the barrages along the Nepal-India border (or are washed down during floods), but survive in India, contributing to the populations in the TAL rivers, albeit in India.

With recovering wildlife populations, an increase in human-wildlife conflict has been inevitable. Most conflicts in the TAL occur with elephant, rhino, tiger, leopard, sloth bear, wild boar and ungulates. A range of mitigation measures (such as solar power fences, deep trenches, viewing towers and cultivation of

unpalatable crops) have been employed to reduce conflict, with mixed results. Programs to establish community-based anti-poaching units (CBAPUs), Eco-Clubs, citizen scientists, and other education and awareness programs have been successful. Provision for relief funds at community level has been piloted aiming at quick response [15]. DNPWC (2017) has stated that the active participation of citizen scientists in monitoring snow leopards and local people's involvement in community based anti-poaching operations have become a successful model for community empowerment [16].

There has been challenged faced by the Program Management Team due to the Gorkha earthquake of 25 April 2015 and its aftershocks resulted in huge loss of life, injury, and economic damage in 31 districts (Central and Western Regions) of Nepal, affecting all sectors. NPC (2015) has stated that the post disaster needs assessment (PDNA) estimated the value of damage and loss at \$7,065 million, a large proportion of it housing [17]. While reconstruction will take many years and more investment, there is a great opportunity to ensure that building back is not only 'better and safer' but also greener, ensuring healthy ecosystems for disaster risk reduction and natural resources for resilient livelihoods and economic prosperity [18].

III.5 GAPS

The following gaps have been identified to have larger impacts in forest, wildlife, and marginalized people:

- Weak horizontal and vertical inter-sectoral coordination, leading to land use conflicts in case of TAL.
- Concentration of program and project activities in some areas resulting in geographic imbalance.
- The ultra-poor particularly landless and marginalized groups of people still excluded from the mainstream development process.
- Weak integration of climate change that resulted negative impacts in life and livelihoods of the people, plants and wildlife.
- Insufficient integration of conservation friendly infrastructures that restricted the free mobility of wildlife from one place to another.
- Weak governance in addressing forest and protected areas encroachment that there has not been effective anti-poaching campaign and illegal logging particularly in Terai Arc Landscape and Sacred Himalayan Landscape.
- Inability to up-scale livelihood options such as ecotourism and green enterprises in different part of the TAL, SHL and NCPA.

III.6 LESSONS LEARNT

The following lessons learnt have been drawn during the study:

- Forest and wildlife conservation program should go together for species and ecological sustainability. However, local people should be in the centre of biodiversity conservation.
- Plant, animal and human inter-relationship is important factor for the ecosystem/ecological sustainability.
- Commitment to action of Forest Care Takers (Ban Heralu) has remained praiseworthy in order to conserve the forest and wildlife with small incentives. The mobile based technology has become instrumental to increase their efficiency in terms of forest patrolling to control illegal activities works.
- The ecotourism activities particularly the homestay has become the means of income generation of the local indigenous

people. This is the good linkage between biodiversity conservation and economic development. The local people have realized that wildlife and forest are the good source of income through ecotourism. Now, the local indigenous people have established love and affection with wildlife, forest and river.

- Regular trainings, review and reflections workshops and positive response from project staff is needed for the capacity development of Ban Heralu, community based anti-poaching unit, rapid response team members, youths in order to boost the morale for biodiversity conservation.
- The sustainability is only possible where there is link the biodiversity conservation works with livelihoods of indigenous people. The forest and wildlife are closely linked with local people's livelihoods. So, we could not undermine the local people in order to forest and wildlife conservation.
- The mobilization of local youths (women and men) for the conservation of forest and wildlife is instrumental. There is need of linkage between self-employment generation of youths and biodiversity conservation works in order to sustain the species and ecosystem.
- The biodiversity conservation work is the fun rather than burden to the state, community and professionals. People can enjoy in biodiversity conservation works.
- People, plant and wildlife should live together with co-existence and they should love each other if there is no threat for their life, livelihoods and habitat. People, plants and wildlife are the creation of Mother Nature. The conservation workers always should think as integrated approach not in isolation.

IV. CONCLUSIONS

The biodiversity conservation work is instrumental for ecological sustainability. The large majority of the respondents (98.63 %) have found happy towards the programs due to getting direct benefits from the buffer zone programs. However, it is yet to be strong enough and large coverage to make a difference in the life of poor and marginalized people. There have been a still 20 per cent ultra poor people excluded from the benefit sharing of mainstream development process. In the areas, the participation of women in the development process has increased particularly in decision-making process at households, community and municipal level. Most of the natural grasslands in Terai have now been converted for housing and agriculture farming. Many grassland patches in protected areas are being encroached by woody perennials in the absence of the annual monsoon floods that set back natural succession and maintain grasslands. However, There has been increased tiger and rhino population and community based conservation work has enhanced in the last couple of years. The satellite radio monitoring of snow leopard has been carried out and established Gaurishankar Conservation Area are regarded as significant work supported. In case of Sacred Himalayan Landscape, conservation work together with local communities is facilitated, wildlife crime control unit was established, and capacity building of government staff and local communities has been enhanced. In the program areas, human-wildlife conflict, wildlife crime and encroachment of forest areas are the challenges faced by the implementing agencies. The community-based monitoring system particularly in wildlife poaching control, control illegal logging, and marketing of non-timber forest products based enterprises need to be strengthening. However, the biodiversity conservation work is challenging and time consuming. There is a need of linkage, coordination, collaboration with stakeholders

and integrated approach to develop relationship between people, plant and wildlife species.

V. AUTHOR'S CONTRIBUTION

Author contributed solely all part of the article.

Conceptualization: Nar Bikram Thapa
Methodology: Nar Bikram Thapa
Investigation: Nar Bikram Thapa
Discussion of results: Nar Bikram Thapa
Writing – Review and Editing: Nar Bikram Thapa
Supervision: Nar Bikram Thapa
Approval of the final text: Nar Bikram Thapa

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