

Chapter 10

Leveraging Conservation Benefits through Ecosystem-Based Services Approach and Community Engagement in Wetland and Riparian Ecosystems: The Case of Conserving Black-Necked Crane and White-Bellied Heron in Bhutan



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Abstract The ecosystem services approach is increasingly being used to restore, enhance, and protect the resilience of an ecosystem in order to conserve biodiversity while considering nature and social-ecological system. The review of the ongoing projects on black-necked crane and white-bellied heron conservation in Bhutan demonstrated that the wetland, riparian, and forest ecosystems are subjected to a range of pressures from development and human interventions. Despite undertaking various interventions to address the challenges of protecting and conserving bird species, especially the white-bellied heron, population has remained dismally low (25) over the last 17 years. The communities living in and around the project areas are largely dependent on natural resources and are vulnerable to any change on natural resources as a result of interventions. Attempts have been made to increase community engagement and participation in conservation activities. The lessons learned from the ongoing projects show that maintaining the interrelationship of the wetland, riparian, and forest ecosystems and the communities is crucial to enhance sustainable conservation of forestry and farming practices, integrated soil and water management, physical infrastructure planning, and livelihood-based conservation. This integrated approach to conserve and manage the natural ecosystems needs involvement of stakeholders from different sectors including communities. The way forward is suggested to establish a landscape-level framework to coordinate and integrate the inter-sectoral interventions and actions. In order to realize the adoption and integration of these actions within this holistic umbrella, various appropriate management and strategy actions are recommended that can lead to win-win situation.

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10.1 Introduction

10.1.1 *Biodiversity Conservation*

Biodiversity conservation movement started with the late nineteenth century in response to increasing pressure on natural resources and fundamental change of public views regarding the nature of relationship between human and nature (Jepson and Whittaker 2002). In the early days of biodiversity conservation, the aim to protect and preserve nature was mainly connected to exploitation for intellectual and aesthetic contemplation with few moral responsibilities to ensure the survival of threatened life form (Ladle and Whittaker 2011). Over the past years, a wide array of different conservation-oriented approaches, based on multiple values of biodiversity, have been developed and enacted from local and regional activities, such as protected area establishment, ex-situ conservation, recovery planning for species, and specific threat management to the global scale inter-governmental policy developments such as Convention on Biological Diversity (CBD) and Convention on International Trade on Endangered Species (CITES) (Whittakar et al. 2005; Ingram et al. 2012). The ecosystem-based approach is used worldwide to restore, enhance, and protect the resilience of an ecosystem so as to protect biodiversity while considering nature and social-ecological system (Lanhgans et al. 2019). The ecosystem services concept in biodiversity conservation is pursued to understand the way in which natural resources benefit people, and it is increasingly being used to support sustainable management of biodiversity and ecosystems (Ingram et al. 2012).

Bhutan's policy on environment and biodiversity is enshrined by the constitutional mandate, committing the country to maintain 60% forest cover in perpetuity. Forest Policy 2011, Forest and Nature Conservation Act 1995, and National Biodiversity 2015 provide an enabling environment to manage biodiversity, meeting the long-term needs of the people. The Renewable Natural Resources (RNR) sector comprising forest, agriculture, and livestock is the second largest contributor to Gross Domestic Product (GDP) at 15.7% (MoAF 2015). It is accorded high priority since it directly contributes to poverty alleviation, sustainable rural livelihood, food and nutritional security, and other environmental services. Forest Policy and National Biodiversity Strategies and Action Plan of Bhutan 2014 promotes integrated approach to biodiversity management using ecosystem services approach to benefit people by identifying, assessing key ecosystems and ecosystem services and safeguarding for human well-being. In the international front, Bhutan committed to remain carbon neutral at the 15th UNFCCC Conference of Parties (COP) in 2009 in Copenhagen, Denmark. In addition, Bhutan submitted the Intended Nationally Determined Contribution (NDC) in September 2015 towards the Paris Agreement, re-iterating Bhutan's pledge to remain carbon neutral.

10.1.2 Applying Ecosystem Services Approaches to Biodiversity Conservation in Bhutan

Bhutan is rich in natural resource with 70.6% of the total land area under forest cover (MoAF 2017a, b). More than 51.56% Bhutan's forest is conserved through a network of Protected Areas (PA) which are ecologically representative of the major ecosystems ranging from sub-tropical grasslands and mixed deciduous forests to the Alpine ecosystem (MoAF 2015). Humans are an integral part of the PA landscape that poses a challenge to operate the protected areas at the highest standard while maintaining a balance between conservation and sustainable utilization. Integrated Conservation Developed Programme (ICDP) was first initiated in the PA management plans of the protected area in 1990s that attempted to strike balance between conservation and livelihood enhancement in the PA landscape. Grierson and Long (1983) described 11 vegetation zones and sub-zones including a list of common species found in each floristic zone based on elevations and precipitation. Forest ecosystem based on Ohswa (1987) can be broadly divided into three eco-floristic zones—the sub-tropical, temperate, and alpine zones. These natural resources and rural landscapes have huge potential to sustain industries, hydropower, tourism, and rural livelihoods. Forest, agriculture, and livestock are the dominant sectors that provide livelihood, income, and employment to 65% of the population. Numerous glaciers and lakes, rivers, marshes, and springs comprising extensive aquatic ecosystem, besides providing habitats for plants, animals, birds, and insects, are the sources for huge volume of water, accounting to more than 100,000 m³ per capita availability of water annually (Wangda and Norbu 2013; Watershed Management Division [WMD] 2018). Water is mainly used for agriculture and hydropower production. The tourism sector, much of it accruing from the pristine natural environment, is also gaining importance as the main contributor to export revenue. The diverse biodiversity resources are represented by three broad ecosystems, namely forest, aquatic, and agriculture ecosystems (Fig. 10.1).

A significant part of the current and prospective economic gains is derived from the use of natural capital such as forest and other natural ecosystem services. While the direct benefits and provisioning services provided by the forest ecosystem, i.e., food, timber, NWFPs are tangible and have tagged market values, the cultural, regulation, and support services provided by forest ecosystem (e.g., watershed services, biodiversity conservation, natural landscape, and carbon sequestration) are less visible. The apparent and hidden costs of up-keeping watershed services, biodiversity conservation, natural landscapes, drinking/irrigation water and carbon sequestration are borne by Ministry of Agriculture (Ministry of Agriculture [MoA] 2012), and rural people living in and around the natural landscapes but unfortunately many stakeholders including local communities remain unaware of these vital ecosystem services being provided by forest and other natural ecosystems. Recently, an effort has been made to develop an ecosystem valuation system to put monetary values to those intangible ecosystem services (e.g., carbon sequestration, soil protection, climate regulation) and to create awareness about their contribution of

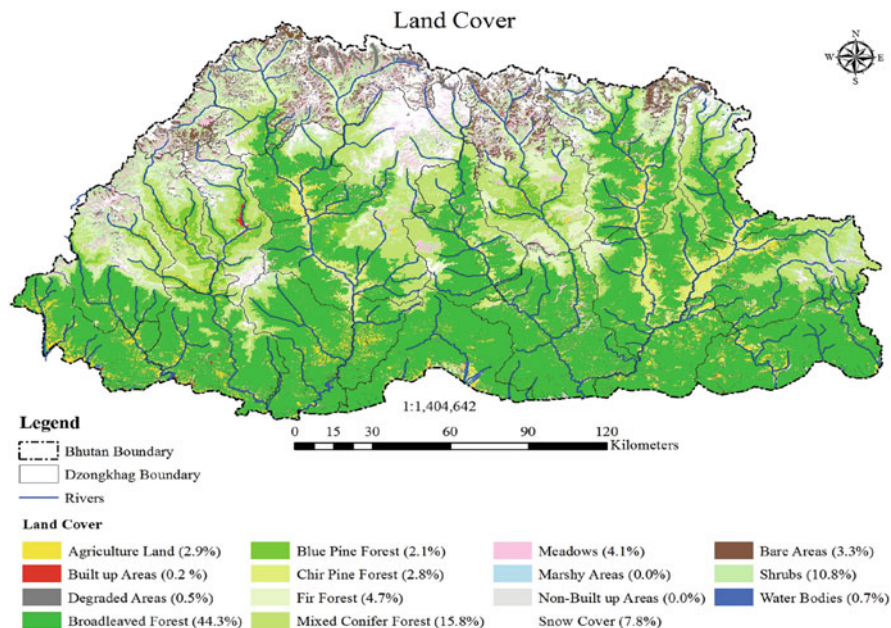


Fig. 10.1 Bhutan land cover classification. Source: Land Use Cover and Mapping Project [LCMP] (2010)

environment service to society (Kubiszewski 2013; Sears et al. 2017; Watershed Management Division [WMD] 2018). Also the human capacity building needs are evident in the areas of mainstreaming contribution of all ecosystem services including regulating services, cultural services, and supporting services into natural capital accounting in the context of national development planning and national income accounting (Watershed Management Division [WMD] 2018). While working on benefit sharing mechanism in the national REDD+ Strategy in 2019, a scoping to link the resources and activate Payment for Ecosystem Service (PES) schemes, between the downstream residents who could derive benefits from forested land and protected watersheds, and those upstream communities managing these resources, was recognized and many actions initiated. One of the options was to invest in the upstream forest and land management in order to reduce soil erosion and sediment flow into streams and rivers. In addition, many of these forestland management options would generate on-farm benefits by maintaining soil fertility and increasing water availability for crop production, leading to improvement in food security and nutrition. The PES has been established for three water drinking schemes across three sites, they are faring well and lessons drawn from them are being used to scale up other PES Schemes (Norbu 2017, Watershed Management Division [WMD] 2018).

10.2 Overview of RSPN's Species Conservation Projects

The Royal Society for Protection of Nature (RSPN) since its establishment in 1987 has been supporting Department of Forest and Park Services (DoFPS), to manage the wetland ecosystem of the Phobjikha as the Phobjikha Conservation Area (PCA) for Black-Necked Crane (BNC) conservation (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014; RSPN 2015) and Riparian Ecosystem of Puna Tsangchu river basin through white-bellied heron conservation program (Fig. 10.2), in collaboration with several international organizations like International Crane Foundation (ICF), ICIMOD, Synchronicity Earth, Mava Foundation, and Bhutan Trust Fund for Conservation (BTF). The collaboration and networking program are done to understand the linkages between conservation and development (Dorji 1998), and to protect endemic and endangered flora and fauna and to maintain sanctity of the unique ecosystems. The conservation works with these two ecosystems have evolved to a multi-faceted initiative, guided by the concept of integrating biodiversity conservation and socio-economic development (Norbu 2012). This concept is congruous with the local tradition and way of life of harmonious co-existence between the local communities and nature (Pradhan 2011).

10.2.1 The Phobjikha Conservation Area

The Phobjikha Conservation Area (PCA) is a high altitude wetland covering an area of 1200 ha and it is an important wintering habitat for the endangered BNC (Fig. 10.3). The core wetland (985 ha) at the bottom of the valley was declared as the Ramsar site in 2015. Historically, the communities here practiced transhumance herding system, using the valley as summer pasture while migrating to the lower



Fig. 10.2 Black-neck Crane and White-bellied Heron in Phobjikha and Puna Tsangchu Basin



Fig. 10.3 Black-Necked Crane Festival and BNC foraging at Phobjikha, one of the wintering sites in Bhutan

valley in winter. The subsistence “pangzhing” cultivation involving burning off open grassland every year to grow buckwheat was prevalent then. This traditional system of food production was gradually phased out to give a way to sedentary mixed-farming, on introduction of potato in 1980s. The majority of farmers grow potato, buckwheat, wheat, and root vegetables. Livestock that include cattle, yak, sheep, pig, and poultry make use of agriculture land, forests, natural wetlands, and scrub meadows.

The BNC (*Grus nigricollis*) is categorized as a vulnerable species on the World Conservation Union’s (IUCN) Red List of Threatened Species and is listed as a totally protected species under Forests and Nature Conservation Act 1995. The bird is endemic to the Tibetan plateau and migrates to the lower regions of the Himalaya in India and Bhutan during winters. In 2019, the number of black-necked cranes that visited. In 2019, a total of 609 black-necked crane overwintered in Bhutan (Tshering 2019). Of these, two-third of them (458) found their winter home in Phobjikha valley, making PCA the most important habitat in Bhutan. The BNC has become part of the community’s cultures and everyday life as evident from the reference in the folklores, dances, and stories. The PCA has several interesting biodiversity features that provide diverse ecosystem services. The dwarf bamboos (*Yushania microphylla*) dominate the core wetland area of the valley bottom and serve as roosting habitat for BNC. A relatively wider valley is the main wetland area and is surrounded by moderate to steep slopes of agricultural lands and forests with pure stands of blue pines and junipers supporting some 4700 people (Norbu 2012).

The Phobjikha wetland ecosystem services appear interlinked among the provisioning, supporting, regulating, and cultural services, as well as immensely important to people’s livelihoods and the well-being of the wetland ecosystem (Phuntso 2010; International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014). Local people considered recreation and tourism highly valued ecosystem services (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014). As per the ecosystem services assessment (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014), the highest value was given to provisioning services, followed by cultural services. Cultural services are increasingly gaining importance

because the unique scenic landscape and rich cultural heritage provide base for tourism and recreational activities. The overall economic benefits generated from the major types of provisioning, supporting, regulating, and cultural services considered in the study worked to around Nu 191.72 million (US\$ 3.6 million) per year (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014).

10.2.2 *Puna Tsangchu Riparian Ecosystem*

The white-bellied heron (*Ardea insignis*), historically known from the Eastern Himalayan foothills, is presently not reported from many of its home ranges in Burma, Nepal and Bangladesh. Currently, only about 60 individual birds are reported worldwide with the highest from Bhutan (25 individuals in 2019). Bhutan's WBH population in 2019 is recorded as 25 indicating a critically low trend (Pradhan 2019). The WBH is enlisted in schedule I as the protected species by Forests and Nature Conservation Act 1995 and is categorized as a critically endangered species in the World Conservation Union's (IUCN) Red List of Threatened Species 2018. This present state of dwindling population is attributed to the shrinking habitats of WBH, owing to increasing anthropogenic pressures in the face of changing climate. The ecology, biology, and population dynamic of WBH is little known and is restricted to the study carried out by RSPN (RSPN 2015). The best known WBH habitat is found along the Puna Tsangchu and Mangdichu basins and the habitat mainly consists of riparian forest and wetland ecosystems between 100 and 1200 m above sea level (Fig. 10.4). Lately, the sightings were also reported from Doksum and Yangbari along the Gongri–Kurichhu and Drangmechhu basins, in the eastern part of the country. The WBH habitat is mostly scattered and fragmented, due to developmental and anthropogenic activities, such as construction of massive infrastructure for hydropower plants, road and sand mining, and other economic activities along the river basins. The communities living along these river basins practice subsistence agriculture farming and they are highly reliant on forest, rivers, pastures,



Fig. 10.4 Typical WBH habitat and nesting sites along the Puna Tsangchu Basin

and wetlands for their living. These increasing development and anthropogenic activities pose serious threats to the endangered WBH habitat and community's livelihood as well. As various pressures mount on WBH habitat and forests, community's access to local resource use is restricted by forest rules and regulation in order to avoid overuse of resources. In such situation, communities often resort to illegal timber/NWFP collection and fishing from forests and rivers to take out their livings which further deteriorate the WBH habitat. To provide alternative economic and employment opportunities and to earn support for WBH conservation activities (e.g., plantation, safeguarding/monitoring WBH population), community incentive-based participatory approach to WBH conservation is underway in the Puna Tsangchu Basin (RSPN 2019b).

Considering the fact that co-existence of WBH and local communities along these rivers is dependent on keeping all natural ecosystems intact and healthy, the communities of the Puna Tsangchu are also taken on-boards to assist RSPN in conservation activities by engaging them in population survey, habitat mapping, advocacy, and educational program. The ongoing RSPN study on population dynamic including genetic and captive breeding activities will add new knowledge to bring about sustainable protection and conservation measures and actions to WBH conservation. Recognizing the importance of community participation for success of WBH conservation program, the focus is on community involvement of community right from project planning, implementation to monitoring. This community participatory approach to conservation is expected to empower the communities and increase their ownership and participation in WBH conservation.

10.3 Projects' Issues, Challenges, and Interventions

The ongoing projects at Phobjikha, Bumthang, Lhuntse, Khotokha, and Bumdeling on Black-Necked Crane (BNC) conservation and white-bellied heron conservation in Puna Tsangchu and Mangdichu river basins are supported by international organizations like International Crane Foundation (ICF), Krupp foundation, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), NABU International, Mava Foundation, Puna Tsangchuu 1 & 2, Synchronicity Earth, Alice C. Taylor Trust, Mava Foundation, NatGeo, and Bhutan Trust Fund for Conservation (BTF). The projects' biodiversity conservation and management issues and challenges are attributed mainly to inadequate knowledge and lack of understanding on BNC and WBH ecology and human–bird interaction, habitat degradation, and lack of coordination and participation amongst stakeholders. The interventions are selected and strategized to address a combination of social, ecological, and technical issues and constraints with emphasis on community-based and nature-based solutions (Tables 10.1 and 10.2).

Table 10.1 A summary of project issues, challenges, and interventions in Wetland Phobjikha Conservation Area and other areas (Bumdeling and Bumthang)

Project Interventions		
Challenges	Research	Conservation and livelihood activities
<ul style="list-style-type: none"> - Inadequate knowledge on wintering BNC ecology - Habitat (wetland) degradation—Anthropogenic and Natural – development pressures - Encroachment - Direct threats posed by stray dogs/natural predators - Lack of coordination among stakeholders - Lack of coordination among BNC regions 	<ul style="list-style-type: none"> - Wetland Ecology - Community perception study - Mapping migration routes and breeding/wintering habitats (Fig. 10.5) - dietary composition 	<ul style="list-style-type: none"> - Community-based sustainable tourism (CBST) - Electric fencing - Solid waste management - BNC festival - Roost maintenance (Fig. 10.6) - Annual BNC census, installation of flight diverter on the power lines
		<ul style="list-style-type: none"> - Community consultation in perception studies - Mapping resources - Collecting issue/constraints - Frame conservation and livelihood program

Source: Tshering (2019)

Table 10.2 A summary of issues, challenges, and project interventions in Puna Tsangchu and Mangdichu Riparian Ecosystems

Challenges	Project Interventions		
	Research	Conservation and livelihood activities	Community engagement
<ul style="list-style-type: none"> – Inadequate knowledge on WBH habitat ecology, biology, and population dynamic of WBH – Infrastructure Development such as hydropower projects put pressure and loss of habitats (Fig. 10.7) – Touristic activities such as rafting and camping along rivers disturb herons during feeding and roosting (Fig. 10.7) – Illegal fishing activities (Fig. 10.7) 	<ul style="list-style-type: none"> – Riparian Ecology – WBH population survey and monitoring – Nesting biology – Ex-situ conservation (captive breeding) 	<ul style="list-style-type: none"> – Education and awareness program – Sustainable livelihood and partnership with stakeholders. Fishery pond, piggery, poultry, organic agriculture, Horticulture, drinking water, and apiculture provided – Eco-restoration – Community protection (patrolling) and monitoring 	<ul style="list-style-type: none"> – Established local conservation support group community group) LCSG and resource group (RG), DoFPS – LCSG monitors the WBH population – Any illegal activities occurring in the WBH habitats are reported to RG. – The RG helps the LCSG to settle the case, Implement project activities

Source: Pradhan (2019)

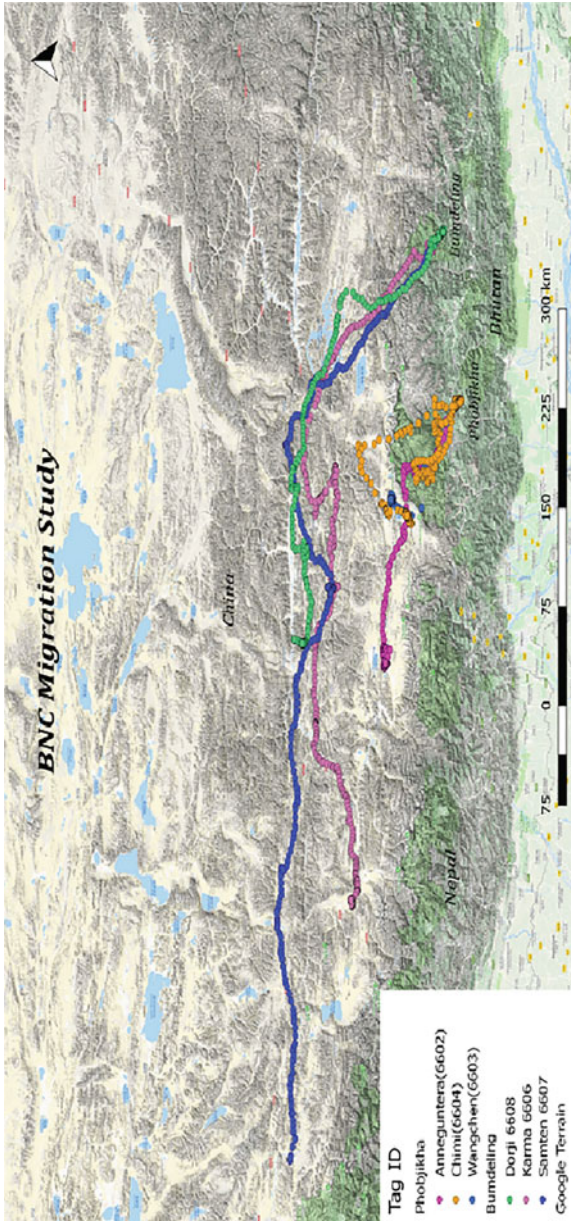


Fig. 10.5 Bhutan–Tibet BNC transmigration routes (Source: Tshering 2019)



Fig. 10.6 Restoring BNC roosting areas at Phobjikha (removing *Berberis* and *Juncus* species)



Fig. 10.7 Human-induced risks and disturbances on WBH and its habitat along the Puna Tsangchu (Basin hydropower development, WBH juvenile crashing against a transmission line, fishing, and rafting)

10.4 Experiences and Lessons Drawn from Project Implementation

1. The wetland and riparian ecosystems in the project areas are subjected to a range of pressures from development and human interventions such as hydropower, roads and hotel construction, tourism, intensive farming practices, insufficient infrastructure planning, and uncontrolled grazing, which have led to degradation of riparian and forest ecosystems, drying up of wetland, agricultural land fragmentation, and increasing waste. Threat of invasive flora species on the wetland ecosystem in Phobjikha due to human interference is evident that is making WBH feeding and roosting areas overgrown with bamboo, *Berberis*, and *Juncus* Spp. (Photo Plate 4 Fig 10.6, Wangda et al. 2011). Maintaining the interrelationship of

the wetland, riparian and forest ecosystems, and the communities is essential to enhance sustainable conservation of farming and forestry practices, integrated soil and water management, physical infrastructure planning, and livelihood-based conservation interventions, that will further add values to the wetland and riparian ecosystem services provision. Such integrated approach to conserving and managing natural ecosystem needs involvement of stakeholders from different sectors including communities starting from project activity planning, implementation to monitoring.

2. Potato farming has become the main income earner for Phobjikha farmers and the majority of them grow potato as a single cash crop. The increasing use of chemical fertilizers to enhance potato production has resulted to contamination of land, soil, and water quality, that can lead to pollution and possible health problems. Livelihood diversification is seen as a part of adaptation strategy in the project areas and should be promoted over economic dependence on monoculture crop such as potato. One potential option is to promote nature-based farming that connects communities to the tourism supply of food and other products (home stay and handicrafts) (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014).
3. Endowed with beautiful landscape and conditioned by occasional chance to see the BNC every winter, Phobjikha valley is increasingly becoming an attractive tourist destination. There is a huge potential for ecotourism, particularly low volume, high quality/end tourism. Revenue generated from the recreational services (tourism) ranks first in terms of its contribution to total economic value of Phobjikha wetland ecosystem, followed by provisioning services and regulating services (carbon sequestration) (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014). In Puna Tsangchu Basin too, the increasing development activities (e.g., hydropower and tourism) are gradually influencing the natural landscape dynamics, affecting the fragile WBH habitat and local people livelihoods. While the tourism can bring about development, the unregulated tourism can have adverse impact on the natural ecosystem and community well-being. Thus, promoting inclusive forms of ecotourism that integrates local community development and nature conservation is vital in these project areas.
4. The number of BNC visiting Phobjikha valley annually has increased over last 32 years, but it has decreased at Bumdeling, which is the other important wintering wetland for BNC (Fig. 10.8). A small number of BNC visiting Khotokha, Bumthang, and Lhuntse has remained steady over the years. There is a concern that the increasing human-induced activities at the roosting and feeding places can alter the BNC habitats leading to reduction of the values and usefulness of the associated ecosystem services. This change warrants for actions to restore and maintain roost and feeding areas at Phobjikha and other wintering sites. As BNC breeds and lives the major part of the year in China (Tibet), the trans-boundary networking and collaborative research to understand its habitat ecology and transmigration and movement in totality are essential (Tshering 2019).

Fig. 10.8 BNC population trend in Bhutan (Tshering 2019)

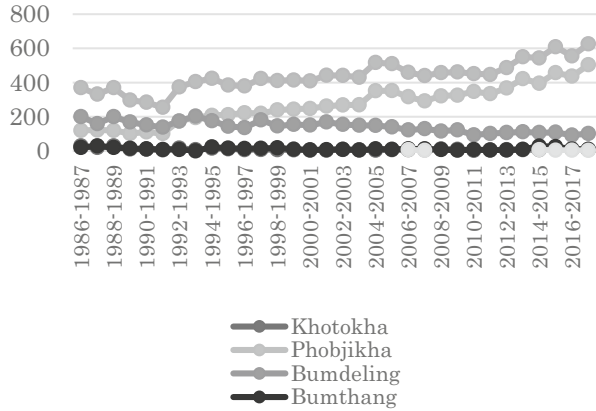
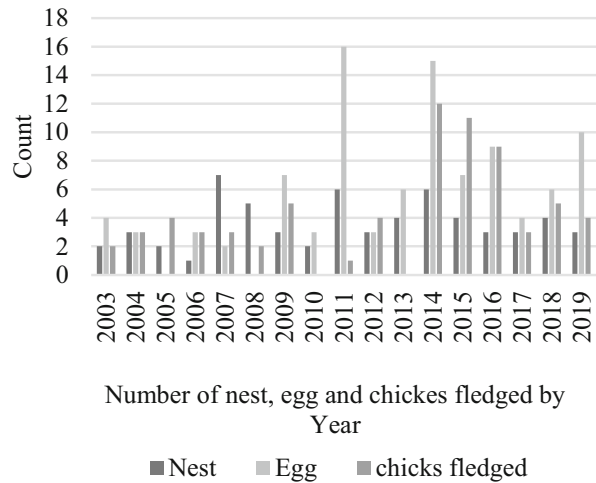


Fig. 10.9 WBH Nest statistics from 2003 to 2019 (Pradhan 2019)



5. The growing concern on low population of WBH continues and looms over WBH future, despite various works undertaken on awareness and advocacy, eco-restoration, population survey, and monitoring. Research works on habitat ecology, population and nesting biology, ex-situ conservation including captive breeding need up-scaling and intensification. The WBH annual monitoring record from 2003 to 2019 on eggs and chick fledging suggests that there is a huge mortality during egg hatching and chick fledging and researchers need to be more vigilant during these critical periods (Fig. 10.9, Pradhan 2019). There is a need to intensify the above works with focus on community engagement through active participation of established Local Conservation Support Group (LCSG).

10.5 Way Forward towards Sustainable BNC and WBH Conservation

Communities in Phobjikha and Puna Tsangchu basin are directly dependent on natural resources and their services for their living. Hence, any change in natural system of these areas can jeopardize the livelihood of the communities. At the other end, the change in the wetland and riparian ecosystems can pose serious challenge to the survival of the vulnerable and critically endangered BNC and WBH species. Further, the impact of changing climate on lives and livelihoods of communities will be more severe, as the majority of the communities are poor and live in remote areas with a few accessibilities to modern facilities such as road, markets, and education. Therefore, reducing pressures and vulnerabilities on natural resources use and community livelihoods, require a holistic approach in which intervention strategies are adapted alongside strategies for poverty reduction, biodiversity conservation, and community development. This calls for a landscape approach (Fig. 10.10) to address inter-sectoral vulnerabilities and constraints by aligning the objectives of conservation and sustainable development within the framework of Nature-based Solution (NbS) (Shacham-Cohen et al. 2019; Dhyani et al. 2018) in order to bring about win-win situations for both conservation and communities well-being. The application of this holistic approach to BNC and WBH protection conservation will require the integration of the following management and adaptation strategies:

10.5.1 *Introducing the Ecosystem and Socio-Economic Resilience Analysis and Mapping (ESRAM) Tools*

As climate change impact is becoming more pronounced on biodiversity conservation and communities well-being (Choden and Norb 2013), the ESRAM framework is a potential framework to be introduced as a planning tool to guide assessments of social-ecological resilience in the context of climate change adaptation in the project areas. ESRAM analyzes and maps resilience linked to ecosystem and socio-economic systems taking into account climate, ecological, social, economic, cultural, political, and institutional factors (SREP 2017, 2018). The ESRAM study will help in identifying the relevant ecosystem-based adaptation (EBA) measures and intervention activities that will guide in EBA activity implementation. The information and knowledge gained through ESRAM will be shared to support establishment of similar holistic planning, conservation and management approach to other biodiversity programs.

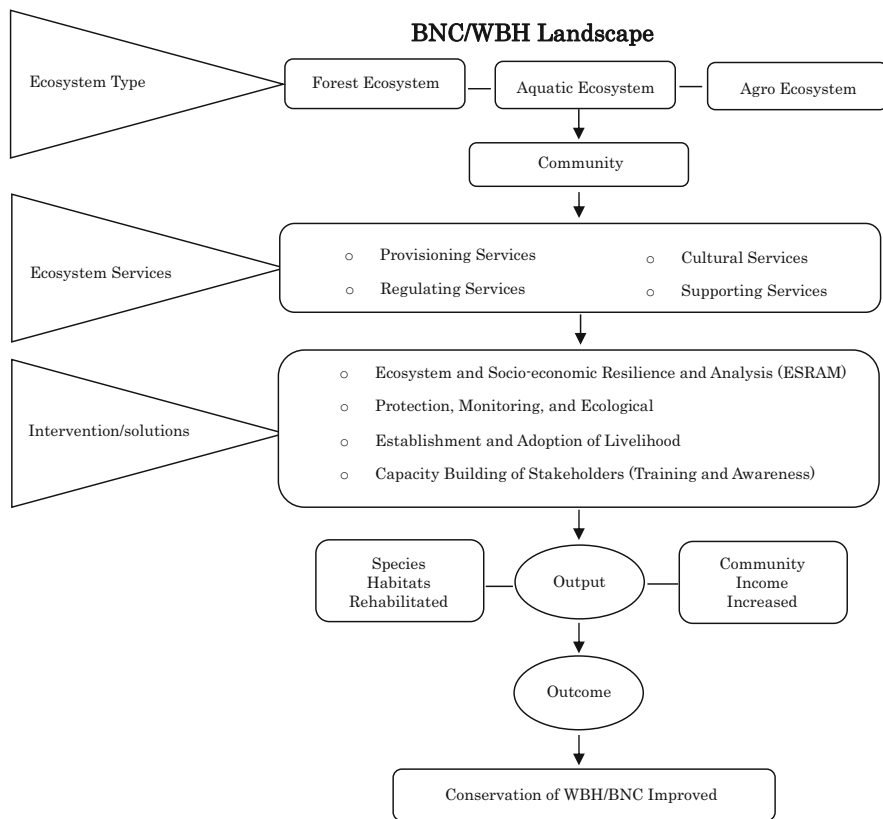


Fig. 10.10 Landscape ecosystem approach framework to BNC and WBH conservation (adapted from Ecosystem Approach, Shacham-Cohen et al. 2019)

10.5.2 *Managing Natural Ecosystem for Sustained Ecosystem Services*

The majority of communities (e.g., in Phobjikha) perceived that the forest cover and availability of fodder, fuel wood, and other NWFP have decreased over the last 10 years due to population growth and overuse of forest resources (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014). Increasing unplanned development activities and intensive farming practices has resulted to degradation of riparian and forest ecosystems, drying up of wetland, fragmentation of agricultural land, and increasing wastes that have put at risk the sustained provision of ecosystem services. Local land use planning with zoning and the zone-specific management plans and guidelines will be prepared and managed to enhance systematic utilization of resources according to land and forest use capabilities and community needs. This calls for

an integrated ecosystem approach to maintain inter-linkages between conservation and development for ensuring ecosystem sustainability and people's well-being.

10.5.3 Diversifying Livelihood Options to Enhance Livelihoods

The mainstay of rural livelihood everywhere in Bhutan is agricultural farming. The rural livelihood assessment at Phobjikha shows that the households are dependent on a single potato cash crop. In the context of climate change and its impact on decreasing crop productivity, depending on single crop such as potato may make the communities more vulnerable and poorer. To address the different coping situations, livelihood diversification should be a strategy to adapt to the changing situations and sites including climate change. Livelihood options (e.g., vegetable growing, apiculture, fishery and piggery), climate-smart agriculture (e.g., organic agriculture, agroforestry, conservation agriculture) and traditional crops such as buckwheat, wheat and other cash crop intensifying growing of traditional crops such as buckwheat and wheat, by farmers are some climate-smart initiatives. Livestock rearing is also an important conventional activity that is good both for wetland management and for livestock products (cheese and butter). The climate impact reduction strategies related to NbS such as ecosystem-based adaptation, eco-restoration, forest landscape restoration, sustainable land management, and nature-based tourism are some of the livelihood options planned for implementation in the proposed project (RSPN 2019b).

10.5.4 Linking Ecotourism Services to Biodiversity Conservation and Development

The tourism industry in Bhutan is to operate on the principle on environmentally friendly, socially acceptable and economically viable. The information from Phobjikha shows that the major benefits generated from tourism go outside local economy (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014). This suggests that there is a potential to mobilize resources for financing conservation and development needs by creating values through, e.g., carbon trading and Payment for Environmental Services (PES) and connecting ecotourism to home stay and local products sale in order to benefit local economy. The ecosystem-based services relating to ecotourism are:

(i) Eco-recreation through community-based management of culture and nature for tourism.

In Phobjikha, a few of these trails such as the Gangtey trek and the annual Black-Necked Crane Festival on 11 November are already popular among tourists. The



Fig. 10.11 Promoting ecotourism (BNC dance and birding) for BNC and WBH conservation

local communities will manage a network of nature trails with government and tourism (Fig. 10.11). For Puna Tsangchu River Basin, limited and controlled ecotourism initiatives (e.g., birding and trekking) to popularize and promote WBH conservation can be possible. The brunt of touristic activities (e.g., birding, rafting, camping) on environment and WBH conservation is already visible at the upper Punakha Tsangchu (Pradhan 2019).

(ii) Sanitary services through community-based management of solid waste.

Solid waste management activities were first introduced in Phobjikha in 2003 with public awareness campaigns and distribution of waste bins to shops. Later, some basic infrastructures (land fill, collection facilities, and tractors) were established in collaboration with the local communities and RSPN. Recognizing the potential adverse impacts of solid waste on people's health and on tourism, a community-based solid waste management system will be established and implemented to keep the valley free of haphazard and unsafe waste disposal. Sewerage treatments need to be in place and use of chemicals (soaps, shampoos, etc.) should be discouraged. Besides communities, hotels need to have proper sewerage facilities and should be discouraged to use chemicals that will have detrimental effects on the wetland and its associated species.

10.5.5 Scaling-up Advocacy and Awareness to Raise the Ecological and Cultural Significance of the BNC and WBH Conservation

Although a number of awareness, advocacy, and education programs have been conducted, there is still a need to work more on awareness creation and the gaining recognition of the Phobjikha Valley and Puna Tsangchu river basin as a Community Conserved Areas (CCA) (International Centre for Integrated Mountain Development [ICIMOD] and Royal Society for Protection of Nature [RSPN] 2014). In general, the CCA designation will provide opportunity to build good rapport with rural

communities and gain support in leveraging biodiversity and ecosystem conservation. Specifically, the CCA will determine to what extent the ecological, cultural, and religious values of the BNC and WBH can support the conservation of the landscape and reduce the risk of depleting the wetland and riparian ecosystems. The value of wetland and riparian ecosystem must be assessed and explored in terms of its local, regional, and global significance. Research and monitoring need to be continued and the information shared through systematic database management and dissemination system to a wider audience. Further development and promotion of BNC visitor Centre, Phobjikha, and WBH Captive Breeding Centre, Changchey, will facilitate enhanced understanding about wetland and riparian ecosystems conservation as well as facilitate BNC and WBH related research.

10.5.6 Motivating Community Engagement in Biodiversity Conservation

Community perception towards conservation is changing in the light of increasing human-wildlife conflict incidences (RSPN 2019a, b, c). Local communities in Phobjikha and Puna Tsangchu basin and elsewhere in the rural areas live with numerous conservation costs. They are subjected to state restrictions on natural resource use so as to maintain the natural ecosystem in a healthy state. The positive state of natural ecosystem has meant increase in wildlife population, which in turn has led to increased crop and livestock depredation. Crop depredation by wildlife is rated by the Phobjikha communities as the most critical constraint to farming (Norbu 2012).

The experiences from other countries show that a community's seriousness to engage in conservation activities is influenced by the tangible social and economic benefits they are offered for the conservative activities they render (Ingram et al. 2012). As a learning process, undertaking ecosystem-based adaptation activities in the ongoing incentive-based conservation program (RSPN 2019b) is expected to enhance income and livelihoods in Puna Tsangchu basin through engagement in vegetable growing, fish farming, bee-keeping, and piggery activities (Fig. 10.12).



Fig. 10.12 Livelihood and conservation activities (electric fencing and fish pond) through community engagement

There are plans to work on ecosystem-based adaptation livelihood options such as organic farming and insurance-based HWC solution to compensate livestock loss and crop depredation (RSPN 2019a). Community engagement is the key to the success of the project and it will continue to work through LCSG participation, right from planning, implementation to monitoring of all projects. These arrangements will motivate the local communities and enhance their sense of ownership of the natural ecosystem and active engagement is expected as they will be receiving direct benefits from the conservation and livelihood activities.

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