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Community-based conservation in Eastern Himalayan biodiversity hotspot- a case study

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Biodiversity resources of southern bank of Yarlung Tsangbo river valley in South Tibet and Bumdelling-Tawang corridor in the eastern Bhutan are less explored by tourism and urbanization. Institutional initiatives for the conservation of these rich biodiversity areas under the traditional ownership of local communities of Arunachal Pradesh led to a community-based conservation model of Community Conserved Areas (CCA). Spontaneous participation of the stakeholders in these CCA was lacking because conservation objective was conflicting with traditional livelihood practices. To create new livelihood opportunities, the village institutions mobilized community-based leisure models and aligned these alternate livelihood objectives with ecological conservation. These economic initiatives met the challenges of bureaucratic administration, restricted access being close to international boundary with Bhutan & China, ineffective promotion by government agencies and, the threats caused by the hydroelectric dam project. Strategy implementation was flawed because of the information sharing mechanism between China-India and India-Bhutan is constrained due to international borders. Internal challenges of indigenous CCA were limited customer integration, skewed societal acceptance of leisure-based livelihood practices, and capital cost of conservation capacity. Marketing of tourism in CCAs of Thembang and Zemithang as nature tourism destination requires all-weather road, sustained technical and financial support, and distribution linkages. This research discusses the critical success factor of Zemithang as an expanding CCA and limitations of Thembang CCA in mobilizing host community support. The authors argue that the community-based biodiversity conservation in the western Arunachal Pradesh must be supported by a participatory format of alternate livelihood opportunities.

Keywords: Arunachal Pradesh, Alternate livelihood opportunities, Community based bio-diversity conservation, Monpa tribe
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Conservation models in rural destinations stress on the compatibility of various forms of sustainable development of its ecology and the cultural, livelihood, and the divergent needs of its inhabitants[1]. The host community or the indigenous population has a high dependency on the ecology of the destination for their livelihood[2] apart from the supply side, demand side and the system. The host community and the indigenous population[3] of Himalayan destination are identified by the heritage, lineage, geographical connections, their culture, and agro-pastoral diversity[4]. Community-based conservation activities encourage and support objectives of economic[5] and social development, conservation, and sustainability[6]. Community-based tourism (CBT) is a responsible way of holding sustainable benefits for the ecology, host community[7], and, the emerging destinations providing a satisfying experience to the tourist, visitor, travel writer, tour operators, and researchers[8]. CBT model requires the host community to accommodate the demand side to visit their villages & destination with the provision of overnight accommodation resulting in the diversification of the destination as regional ecotourism brand[9]. Community conserved areas[10] or indigenous & community conserved areas[11] are geographical spaces governed by ethnic communities of the region responsible for the overall management of their agro-pastoral livelihood[12] and forest resources. Indigenous community conserved area[13] is a natural or modified ecological area containing significant biodiversity content and ecological services, voluntarily conserved by indigenous communities through customary laws or joint forest management committees. One successful example of CCA is *Khonoma Nature Conservation and Tragopan Sanctuary* of Kohima in

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Nagaland, India[14]. The set of collective activities encourages and supports objectives of economic empowerment, social development, conservation of natural assets and achieve sustainable business[15]. The state of Arunachal Pradesh is geographically isolated[16] and thus faces bureaucratic limitations such as restricted access or Inner Line Permit procedures. Other issues are limited policy support in the cost center approach for the infrastructure investment, and, high dependency of the watershed & forest resources[17] for energy needs. Appreciative participatory planning & action develops confidence in community-based initiative plans in rural areas for conventional investments[18] involving economic sustainability. Traditional knowledge[19] is a symbolic ethnic identity of an indigenous community[20] and it could be a strong proposition for conservation and economic benefits[21]. Collaborative planning of village institutions (*Khel, Durbar, Gaonburah*) with educational, religious beliefs, the cultural and administrative framework can lead to responsible models having a lower environmental impact, lower levels of consumerism and may reduce economic leakages in the value chain[22]. Some of the best practices in the tourism policy of the Namibia government[23] were to augment a Community Tourism Office, active participation at the grassroots level and implementation of non-project based practices in rural settlements with unique wildlife attractions providing significant economic benefits to the host community. Volunteering in education, healthcare, transparency in the exploitation of natural resources, and social safety program are also other variables adopted by a rural community in the State of Quintana Roo, Mexico[24] for cooperative sectors in Sian Ka'an Biosphere Reserve. The governance of commercial exploitation with the opening of rural destinations[25] must be studied so that unplanned tourism development will put little pressure on the carrying capacity, overcrowding, and biodiversity. Considering the theoretical framework, review of literature, and the possibility of a relationship between conservation with leisure business in the Himalayan destinations, this study is carried out to understand the over-exploitation of non-timber forest produce[26] in the western Arunachal Pradesh, role of traditional institutions[27] prevailing in *Monpa* community and to identify factors that determine the success of a CCA.

Materials and Methods

The elements of the research population are village institutions *Gaonburah* (traditional village head), the village council, *Khel* (customary laws), and NGO/society; households of the village, and, policymakers. The study compares the opinion of environmentalists, bird watchers, and researcher, travel writers encountered in the case study sites. The following methods are used to select the cluster sites in this study from the Himalaya biodiversity region: -

(a) The conservation activities of the host community having significant participation of the village-based customary institutions and/or with significant technical support from an institution.
(b) These sites may have opportunities for alternate livelihood based on nature, wildlife and culture. These sites may coincide with the early growth stage of the destination life cycle[28,29].
(c) A specified part of revenue from the business of alternate livelihood receipt is provisioned for conservation and capacity building initiatives in the customary governance format of the village.

Secondary data was collected from Ministry of Tourism, Ministry of Home Affairs, Directorate of Economics & Statistics, Directorate of Information & Public Relations, reports published by North Eastern Council, published news-letters, Tourism Barometer of UNWTO, journals & conference proceedings, doctoral thesis, census survey 2001, census survey 2011, reference books including collection of research articles, reference literature from National Geographic Society, WWF, wiki maps, google earth, Forest Survey of India by Ministry of Environment & Forest, Government of India, and, NGOs working in ecological conservation. Primary data is collected through structured interviews on customary laws, community forest rights, agro pastoral resources, habitat conservation, alternate livelihood opportunities, institutional funding and technical support. Information is also collected from environmentalists, bird watchers, researcher, and, travel writers. The study is limited to Monpa settlements in Himalayan biodiversity hotspot[30]. The case-based method is used in this research paper. The two CCA clusters selected in this study confirms to the requirement of complimenting the rural alternate livelihood business model of the destination aligning with the community-based initiatives with an exception of not including private equity partners.

The first site of this study is the Thembang village in the West Kameng District (Fig. 1: Watershed and elevation map of West Kameng district) of Arunachal Pradesh. The old name of Thembang village is *Yuchho-pema-chen*. It is a hilltop at an altitude of 2300 m above mean sea level (MSL). The nearby hamlets are *Semnak*, *Cherong*, *Panchavati*, *Lagam*, *Gonthung*, *Pangma*, *Chander* and *Lachong*. The community land comprises of the forest, grazing slope, agricultural land, and the barren land. The village had a strong fortification from all the sides, but now the ruin has two stone-walled gates. Tourists can witness the traditional lifestyle of the Monpa tribes and view the highest peaks of the Himalayas in Arunachal Pradesh. These peaks are *Gorichen*, *Kangto*, and *Nyegi*. Logging, cultivation, and

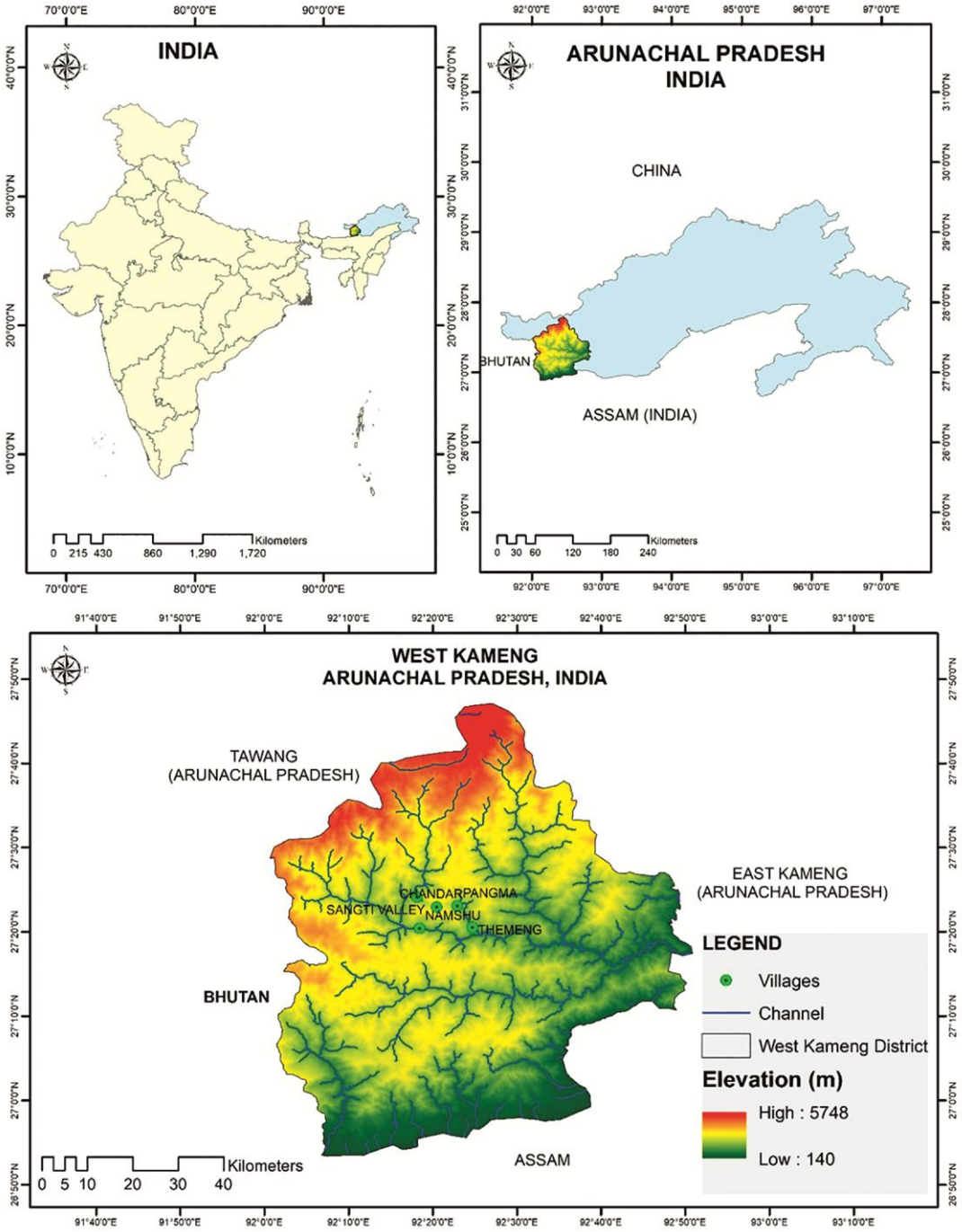

Fig. 1 — Watershed and elevation map of West Kameng district of Arunachal Pradesh, India

livestock are the primary livelihood in Thembang. Other professions are carpentry, daily wage works at Border Roads Organisation (Ministry of Defence, Government of India) Vartak projects (highways and tunnels) and as trail guide for Indian Army.

The second site is Zemithang in Tawang district (Fig. 2: Watershed and elevation map of Tawang district) of Arunachal Pradesh. For research purposes, the author has selected Muchat and Lumpo village for initiatives of community-based conservation. The residents of Zemithang belong to the Monpa community and practice Buddhism. The community land is owned by the village council, headed by *Gaonburah*. The village council and the *Gaonburah*

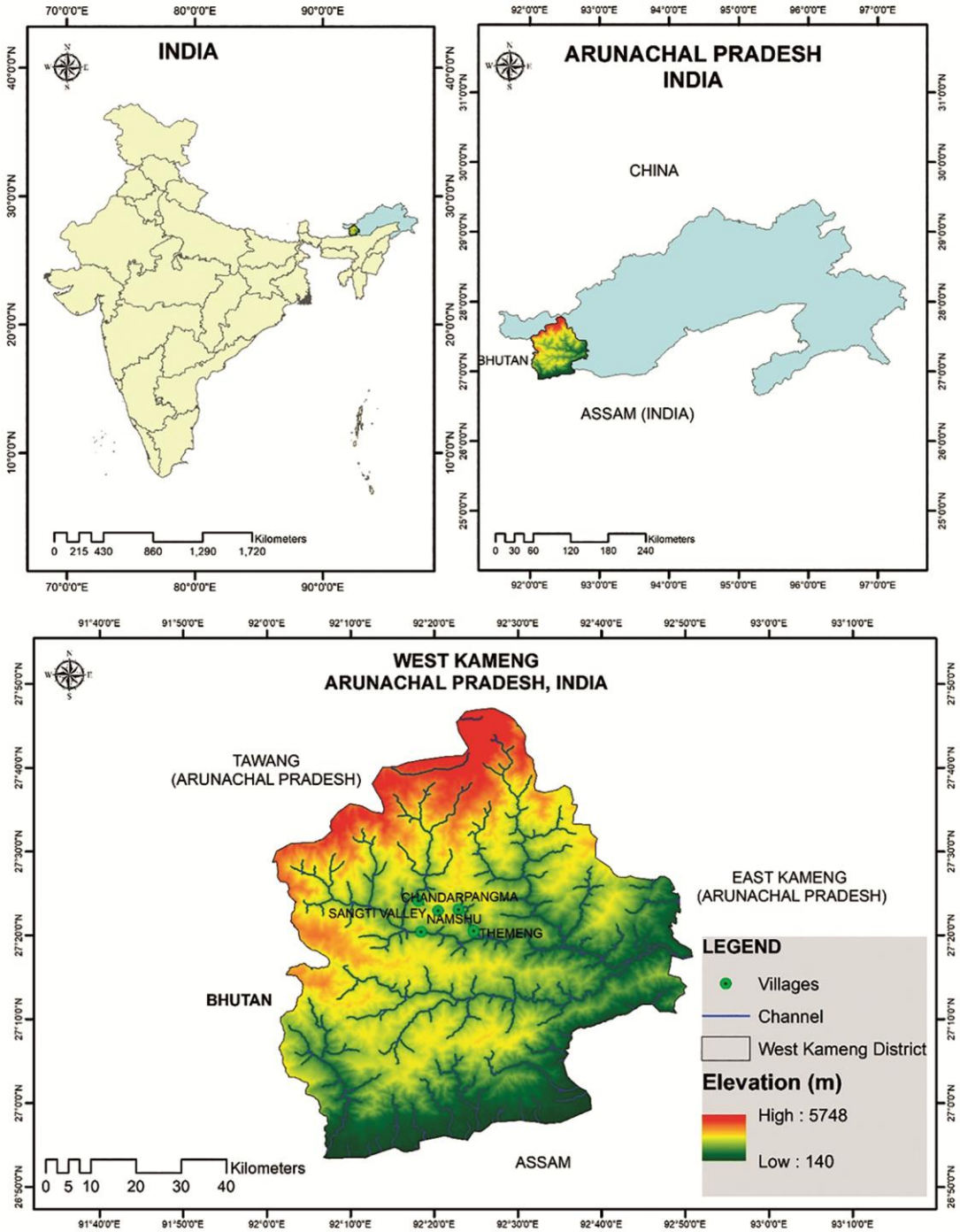

Fig. 2 — Watershed and elevation map of Tawang district of Arunachal Pradesh, India

(village headman) take the decision related to the community land for farming, grazing, or similar lease arrangement with a lessee or shared with the whole village. The *Gaonburah* or the village head-person is a political and a traditional institution of these villages. The Lama/Rinpoche is a spiritual leader of these villages and has little role in nomination or selection of the *Gaonburah* position.

The folks of Muchat and Lumpo villages claim to have sizeable numbers of red panda, barking deer, wild boar, himalayan langur, snow leopard, black deer, snakes, black necked crane, blood pigeon, kite and mountain goats. But, neither is there any census available for the wildlife nor any exercise ever done to estimate the wildlife diversity & distribution in this region. For the proposed large dam project in Nyamjang Chhu River of this valley, the mentioned list of birds in the Environment Impact Assessment (Table 1 Environment impact assessment list of

Table 1 — Environment impact assessment list of wildlife (mammals/birds) reported in the Zemithang, Arunachal Pradesh, India

Common name	Scientific Name
Barking Deer	*Muntiacus muntjac*
Arunachal macaque	*Macaca munzala*
Hoary-bellied Squirrel	*Callosciurus pygerythrus*
Hog Deer	*Axis porcinus*
Leopard Cat	*Felis Bengalis*
Common Palm Civet	*Paradoxurus hermaphrodites*
Porcupine	*Hystrix indica*
Wild Pig	*Sus scrofa*
Himalayan Black Bear	*Selenarcods thibetanus*
Hairy Footed Flying Squirrel	*Belomys pearsoni*
Masked Palm civet	*Paguma larvata*
Himalayan Goral	*Nemorhaedus goral*
Musk Deer	*Moschus moschiferus*
Red Panda	*Ailurus fulgens*
Snow Leopard	*Panthera uncial*
Takin	*Budorcas taxicolor*
Sambar	*Cervus unicolor*
Crested Serpent Eagle	*Spilornis cheela*
Eurasian Griffon	*Gyps fulvus*
Golden Eagle	*Aquila chrysaetos*
Himalayan Griffon	*Gyps himalayensis*
Black-lored Tit	*Parus xanthogenys*
Black-throated Tit	*Aegithalos concinnus*
Great Tit	*Parus major*
Green-backed Tit	*Parus monticolus*
Grey-crested Tit	*Parus dichrous*
House Swift	*Apus affinis*
Winter Wren	*Troglodytes troglodytes*
Rusty-flanked Treecreeper	*Certhia nipalensis*
Black-faced Warbler	*Abroscopus schisticeps*
Blyth's Leaf Warbler	*Phylloscopus reguloides*
Broad-billed Warbler	*Tickellia hodgsoni*
Buff-barred Warbler	*Phylloscopus pulcher*

(*Contd.*)

Table 1 — Environment impact assessment list of wildlife (mammals/birds) reported in the Zemithang, Arunachal Pradesh, India

Common name	Scientific Name
Chestnut-crowned Bush Warbler	*Cettia major*
Golden-spectacled Warbler	*Seicercus burkii*
Grey-hooded Warbler	*Seicercus xanthoschistos*
Tickell's Leaf Warbler	*Phyloscopus affinis*
White-spectacled Warbler	*Seicurcus affinis*
Yellow-browed Warbler	*Phylloscopus inornatus*
Emerald dove	*Chalcophaps indica*
Hill Pigeon	*Columba rupestris*
Mountain Imperial Pigeon	*Ducula badia*
Oriental Turtle Dove	*Streptopelia orientalis*
Speckled Wood Pigeon	*Columba hodgsonii*
Spotted Dove	*Streptopelia chinensis*
Wedge-tailed Green Pigeon	*Trerons phenura*
Yellow -billed Blue Magpie	*Urocissa flavirostris*
Bar-winged Flycatcher Shrike	*Hemipus picatus*
Black Drongo	*Dicrurus macrocerus*
Common Iora	*Aegithina tipia*
Common Woodshrike	*Tephrodornis pondicerianus*
Eurasian Jay	*Garrulus glandarius*
Ferruginous flycatcher	*Muscicapa ferruginea*
Large-billed Crow	*Corvus macrorhynchos*
Scarlet Minivet	*Pericrocotus flammeus*
Spotted Nutcracker	*Nucifraga caryocatactes*
Ultramarine Flycatcher	*Ficedula superciliaris*
Yellow-bellied Fantail	*Rhipidura albicollis*
Red-headed Bullfinch	*Pyrrhula erythrocephala*
Spot-winged Grosbeak	*Mycerobas melanozanthos*
White-browed Rosefinch	*Carpodacus thura*
Dark-breasted Rosefinch	*Carpodacus nipalensis*
Dark-rumped Rosefinch	*Carpodacus edwardsii*
Rock Bunting	*Emberiza cia*
Grey-backed Shrike	*Lanius tephronotus*
Long-tailed Shrike	*Lanius schach*
Golden-throated Barbet	*Megalaima franklinii*
Great Barbet	*Megalaima virens*
Black Redstart	*Phoenicurus ochrurus*
Blue fronted Redstart	*Phoenicurus frontalis*
Blue Whistling Thrush	*Myophonus caeruleus*
Chestnut-bellied Rock Thrush	*Monticola rufiventris*
Golden Bush Robin	*Tarsiger chrysaeus*
Grey Bush chat	*Saxicola ferrea*
Grey-headed Canary Flycatcher	*Culicicapa ceylonensis*
Long-tailed Thrush	*Zoothera dixoni*
Mistle Thrush	*Turdus viscivorus*
Plumbeous Water Redstart	*Rhyacornis fuliginosus*
White-capped Water Redstart	*Chaimarrornis leucocephalus*
Blood Pheasant	*Ithaginis cruentus*
Crimsonbreasted Woodpecker	*Dendrocopos cathpharius*
Darjeeling Woodpecker	*Dendrocopos darjellensis*
Black Bulbul	*Hypsepetes leucocephalus*
Whitewinged Redstart	*Phoenicurus erythrogaster*
Red-vented Bulbul	*Pycnonotus cafer*
Goldcrest	*Regulus regulus*
Wood Sandpiper	*Tringa glareola*
Black-chinned	*Yuhina Yuhina nigrimenta*
Black-faced Laughing Thrush	*Garrulax affinis*
Chestnut-tailed Minla	*Minla strigula*

(*Contd.*)

Table 1 — Environment impact assessment list of wildlife (mammals/birds) reported in the Zemithang, Arunachal Pradesh, India

Common name	Scientific Name
Cutia	*Cutia nipalensis*
Red-vented Bulbul	*Pycnonotus cafer*
Goldcrest	*Regulus regulus*
Wood Sandpiper	*Tringa glareola*
Green Shrike Babbler	*Pteruthethius xanthochlorus*
Lesser Necklaced Laughing Thrush	*Garrulax monileger*
Red-tailed Minla	*Minla ignotincta*
Rufous Sibia	*Heterophasia capistrata*
Rufous-necked Laughing Thrush	*Garrulax ruficollis*
Rufous-vented Yuhina	*Yuhina occipitalis*
Spotted Laughing Thrush	*Garrulax ocellatus*
Streak-breasted Scimitar Babbler	*Pomatorhinus ruficollis*
Streaked Laughing Thrush	*Garrulax lineatus*
Streaked Wren Babbler	*Napothera brevicaudata*
Striated Laughing Thrush	*Garrulax striatus*
Stripe-throated Yuhina	*Yuhina gularis*
Whiskered Yuhina	*Yuhina flavicollis*
White-naped Yuhina	*Yuhina bakeri*
Chestnut-bellied Nuthatch	*Sitta castanea*
White-tailed Nuthatch	*Sitta himalayensis*
Brown Hawk Owl	*Ninox scutulata*
Red-billed Leiothrix	*Leiothrix lutea*
Common Hoopoe	*Upupa epops*
Eurasian Blackbird	*Turdus merula*
Grey-winged Blackbird	*Turdus boulboul*
Hill Prinia	*Prinia atrogularis*
Oriental Hobby	*Falco severus*
Rufous-winged Fulvetta	*Alcippe castaneceps*
Silver-eared Mesia	*Leiothrix argentauris*
White-collared Blackbird	*Turdus albocinctus*
Yellow-breasted Greenfinch	*Carduelis spinoides*

wildlife reported in the Zemithang, Arunachal Pradesh, India) does not have any mention of the Black-necked crane[31]. However, these endangered birds (*Grus nigricollis*) were sighted and documented by WWF-India (Western Arunachal Landscape Programme of WWF-India) since 2012. Snow trout, a migratory fish species is common in the snow fed drains, streams, and rivers of this region. *Mahaseer*, a species of gamefish of Kameng and Subansiri River migrates upstream in the warm months (May, June, and July) for breeding. Farming and livestock rearing are the two primary livelihoods of the Monpa community of Zemithang. Alternate livelihood avenues are logging, carpentry, road repairing, petty kirana shops, porters, and train guide personals for the Indian Army troops. The agriculture produce includes Khrye (finger millet, *Eleusine coracana* locally called Maruwa dough), roasted barley (*Hordeum vulgare L., nasphey*), spinach (laipatta, *Spinacia oleracea*), cabbage (*Brassica oleracea var. capitate*), cauliflower (*Brassica oleracea var. botrytis*), beans (*Phaseolus*), chilly vegetable (*Capsicum annuum*), cucumber (*Cucumis sativus*), Chong (local onion, *Allium cepa*), Braing (local garlic, *Allium sativum*), Vicsi (coriander, *Coriandrum sativum*), Khe (potato, *Solanum tuberosum*), Mula (radish, *Raphanus sativus*). The common fruits produce include apple, kiwi, plum, peach, oranges, and walnut. Another heritage attraction is the *Ser Tsang Gompa* located in Lumpo village of Zemithang Circle famous for its century old Chamba Statue of *Maitreya Buddha*. The three century old Gorsam Chorten (*Chaitya* or *Stupa*), or Chotëm is located in the Zemithang circle.

Results and Discussion

Thembang Bapu Community Conserved Area Management Committee

The first initiative by WWF-India was to support Thembang village to sustainably manage rich biodiversity under their traditional ownership. Modus-operandi was without losing land rights and work for economic development of local villagers through conservation linked livelihood opportunities. The initiative demarcated about 30 sq. km area as Thembang Bapu CCA in the year 2004 and by 2012, it was extended to 635 sq. km area. Thembang Bapu CCA Management Committee was constituted and registered as a not-for-profit Society to assist the village panchayat in managing the CCA and economic development.

Pangchen Lakhar Community Conserved Area and Pangchen Lumpo Muchat Community Conserved Area of Zemithang

WWF-India with the support from Sir *Dorabji Tata Trust* was successful in motivating the villages into forest and wildlife conservation activities by institutionalizing Community Conserved Areas. In the year 2007-08 around 98 sq. km area of community land under traditional ownership of villagers of Lumpo and Muchat was demarcated by village panchayat as CCA under Pangchen Lumpo Muchat CCA Management Committee.

Taking cues from Muchat and Lumpo CCA (PLUMCCA), two more villages, i.e., Kharman and Khelengteng under the guidance of WWF-India under Western Arunachal Landscape program demarcated 85 sq. km area under Pangchen Lakhar Community Conserved Area. The Pangchen Lakhar Community Conserved Area Management Committee was and constituted in January 2011. Considering the rich distribution of red panda (*Ailurus fulgens*) in the area, these two CCA's formed the Pangchen Red Panda

Conservation Alliance under the guidance of WWF-India to effectively work together for conservation red panda. PLUMCCAMC ensures that the conservation activities were given strategic importance by local villagers by promoting CBT as conservation linked income generation option. There are six homestays and a few home-based restaurants in these villages along with a camping venue between the Lumpo and Muchat villages. Two groups of around six healthy adult male from the host villages conducts patrolling in the summer seasons to check hunting and logging activities. The herders of the host villages also provide information about poaching or logging activities based on which village council penalize the guilty/miscreants. Financial audit of the CCA Management Committee was conducted regularly by a Chartered Accountant firm, However, the authors found very few published reports of social audits of CCA operation.

The conservation champions could not implement strategic controls due to limited interoperable information sharing mechanism across the international borders of China-India and India-Bhutan. For instance, the Tibetan antelope (*Pantholops hodgsoni*) is poached in the Hoh Xil nature reserve in Tibet and slaughtered for overgrazing while the same is protected in Arunachal Pradesh, India. The red panda (*Ailurus fulgens*) is poached in China[32] for its fur, tail in marriage rituals, and, for its hide, meat across Sichuan and Yunnan provinces[33]. Whereas, to mitigate the threat to red panda survival[34], it is granted highest legal protection under Schedule I of the Indian Wildlife (Protection) Act, 1972. This is an example of failed strategy to contain poaching and habitat protection due to non-interoperable non collaborative action across India and Tibet Autonomous Region in China[35]. The red panda population continues to decline due to habitat loss, fragmentation, poaching, and inbreeding depression. As a silver lining, in the year 1995, the red panda (*Ailurus fulgens*) was included in Appendices I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora[36]).

WWF-India has helped in awareness creation and capacity building. However, host spontaneous participation of the villages in the community-based conservation was missing because conservation activities were interfering with their traditional livelihoods. The *Gaonburah*, village council (*Panchayats*) and Western Arunachal Landscape management (WAL) of WWF India realized that community participation is useful only when the primary stakeholders are not threatened with their source of livelihood. The host community must agree that the community conservation process can provide additional livelihood opportunities from the same forest and within their traditional agro-pastoral lifestyle. The CCA committees have identified a community-based tourism model to promote the destination aligned with the primary goal of environment conservation. To create sustainable accommodation services, PLMCCAMC initiated to start a few model homestays in the host villages. WWF-India aided the potential homestays and started providing market linkages[37] to increase tourist inflow and improve accommodation occupancy. Likewise, a campsite for tourist is also developed between the Lumpo and Muchat village ensuring that the campsite location will provide exclusive privacy to the tourists even being in the village area. CBT guidelines and rules are framed in such a way that the economic opportunities from guiding, homestay are shared among the village entrepreneurs and some portion of receipts is mandatorily earmarked for environmental advocacy and conservation activities. Thus, a 10% surcharge is being levied as conservation fees from a domestic tourist and 15% from inbound tourist. These practices are not documented in the Pangchen Lakhar CCA, Pangchen Socktsen Diksum CCA in Tawang district and the Mandala-Phudung-Khellong CCA, Nyukmadung CCA and Senge Dzong CCA of West Kameng district.

The critical success factor of the CCA cluster in Western Arunachal Pradesh is in the extent of participation of the indigenous population/host community in the natural resource conservation and habitat protection of the endangered animals. This is to be noted that conservation practices in other states in India, is sponsored by government and legally enforced with conservation statute approved by legislative procedure[38]. Advocacy for ecological conservation is not prominent in the Himalayan watershed under Arunachal Pradesh. Due to the absence of ecological conservation advocacy groups, the impact assessment (EIA) processes are sabotaged for the new reservoir, submerged area & hydro-electric dam projects. However, the Pangchen Lumpo Muchat CCA, the Pangchen Socktsen Diksum CCA, and, the Pangchen Lakhar CCA of Zemithang

were successful in convincing government to withdraw the permission for construction of a mega hydropower dam project on Nyamjang Chu river by documenting and highlighting the importance of the area as one of few wintering habitat of Black Necked Crane (revered bird in Mahayana Buddhism), and other endangered mammals[39].

Conclusion

The objectives of the CCA clusters of western Arunachal Pradesh is to strengthen community stewardship for sustainable management of rich biodiversity under their traditional ownership and creating equitable and sustainable income generation opportunities for villagers from conservation linked livelihood opportunities. With the maturity of the project stages and learning cycle, the environmental norms can be transformed into rules and regulations. Remote and rural areas have a high potential for CBT and promotion of sustainable development[40]. From the analysis of the results, it has been found that CBT can provide sustainable livelihood opportunities for the native communities[41] complemented by the rich biodiversity hotspots in eastern Himalaya, high altitude wetland and the uniqueness of the host community cultural diversity. But no suitable policy level support is observed. Most of the ecotourism sites in India are either protected area (PA) or declared as the area under the jurisdiction of the Department of Forest of the state governments. But in Arunachal Pradesh, a significant number of PA and potential ecotourism sites are in areas with quasi-jurisdiction of traditional ownership and customary laws of the indigenous communities. Thus, for the state of Arunachal Pradesh, it is vital to have a policy that gives more authority to local villagers for participation, management of ecosystems and, livelihood opportunities. The authors argue that CBT initiated by the host community cannot be categorised as an ecotourism initiative in the inception stage. Once the community gets engaged in the CCA and CBT, the stakeholders crave for too much expectations from the initiative and expects tangible results within 1-2 years of participation. This expectation is a tradeoff/return for reducing dependency on collection of forest wood, logging and, restriction in grazing from demarcated habitat protection zones in the CCA. Some expect a subsidy plan for their livestock, regular wage receipts from alternate livelihood activities, and petty work orders for civil engineering construction around the CCA. The authors argue that it is advisable not to promote CBT as a community-based ‘ecotourism' in the initial stage. From the analysis of the mechanism developed and outcome obtained from the project in these clusters the authors conclude significant success of Zemithang CCAs. However, the Thembang CCA initiative was critical in motivating other villages to adopt CCAs in its jurisdiction. Nevertheless, the Mandala-Phudung-Khellong CCA, Nyukmadung CCA, and Senge Dzong CCA of West Kameng had little mentoring from the management committee of Thembang Bapu CCA. The CCA or the indigenous community conserved areas has shown mixed potential for ensuring the economic development of indigenous communities in remote areas without compromising environmental security. The gap in alternate livelihood[42] schemes and dependency on leisure-based opportunities will not motivate host community’s participation in these CCA. Moreover, with the economic disruption of 2020 pandemic situation and geo-political tension between Indian Army and People’s Liberation Army, Arunachal Pradesh government and Government of India should put proper planning through interdisciplinary approach to protect the economic interest of the indigenous community, the strategic interest of Indian Army, and to accommodate the aspirations of the traditional institutions of the eastern Himalayan region in India. The academia and conservation pioneer’s opinion must be tabled for a suitable CCA policy aligned with the India’s 2030 commitment to Paris Agreement[43,44].

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Conflict of Interest

The authors here declare that they have no competing or conflict of interest in this publication.

Authors' Contributions

M Dutta compiled the data and prepared the first draft of the manuscript. P K Dutta reviewed and edited the manuscript.

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