

Conservation of Bolen Springshed, Biological Diversity and Traditional Knowledge under the EB Project Nature Initiative

Topi Basar

Rajiv Gandhi University, Rono Hills Doimukh, Arunachal Pradesh, India

Corresponding author: topi.basar@rgu.ac.in (ORCID ID: 0000-0002-6815-0836)

Paper No. 1061

Received: 18-09-2022

Revised: 26-11-2022

Accepted: 04-12-2022

ABSTRACT

The unique initiative undertaken by EB project nature led to revival of Bolen spring in to perennial flow in 2017 which had completely dried up. Soi Village where the project was started gets sufficient potable water throughout the year, community water tank is sufficiently stored, revival of agriculture in abandoned paddy fields. A key outcome has been 27 Ha of spring shed is restored to medium dense forest. Above 100 Ha of forest has been protected from any kind of deforestation activities and 3 sacred grooves at various locations by the project. About 5000 number of native or wild fruit bearing plants and medicinal plants has been conserved at spring shed forest. Above 70 species of native orchids are conserved which includes very rare and threatened species. The EB project nature is one of the central attractions during Basar Confluence Festival of Tourism Department under State Govt. since 2019. People of Soi and Gori village are making handsome income from tourism, homestays, forest trek guides etc. Due to banning of hunting inside the project area various wild animals like barking deer, Asiatic wild dog, Asiatic black bear, wild boar, porcupine and birds such as crested serpent eagle, chestnut breasted partridge etc. have been spotted due to revival of forest and Spring shed.

HIGHLIGHTS

- Soi village is situated at Basar headquarter of Leparada District, Arunachal Pradesh in Eastern Himalaya of India inhabited by Galo tribe. Soi has a population of 357 (as per 2011 census). Soi, Gori and Pagi are adjoining villages.

Keywords: EB Project, Biological diversity, Bolen Sprinkled, Jhum, Yapom, Sacred grooves, Traditional Knowledge, Indigenous plants

The three main rivers in the area namely Kidi, Hie and Bam Hile was fed by the spring-shed but the rapid drying up of spring-sheds impacted the volume of the rivers and irrigation of agriculture suffered a setback and led to shortage of potable water for the village. Several wet rice cultivation had to be abandoned due to irrigation problem. The total consolidated area of the project is 100 Ha covering many forest area in Soi and Gori but the core area of the project is 27 Ha. The EB project nature was basically conceptualized in the year 2008-09 by its founder Shri Egam Basar, an avid nature conservationist and Director, State Horticulture Research and Development Institute. It was a river and spring rejuvenation project and

commenced in 2011. The project was basically conceived to revitalise the dried Bolen Spring shed in an organically integrated way with targets of forest regeneration, biodiversity conservation and harvesting rainwater to refill the underground water table.

The objectives of this paper are –

1. To discuss the critical role of EB project nature in reviving a dried spring shed and water crises.

How to cite this article: Basar, T. (2022). Conservation of Bolen Springshed, Biological Diversity and Traditional Knowledge under the EB Project Nature Initiative. *Int. J. Ag. Env. Biotech.*, 15(04): 827-835.

Source of Support: None; **Conflict of Interest:** None





2. The impact of jhum cultivation on ecology and biodiversity.
3. To understand the inter-relationship between water, biodiversity, traditional knowledge and development.
4. To study the impact of the EB project on the community.
5. To analyze the policy implications of the project for future.

Arunachal Pradesh, situated in the north eastern part of India is nearly 84,000 sq. km in area and has a long international border with Bhutan to the west, China to the north and north-east and Myanmar to the east. The population of Arunachal as per 2011 census is 1,383,727 and is scattered over 26 districts. The state is inhabited by the world's largest variety of ethnic tribal groups and subgroups numbering over a hundred and each tribe speaking their own-language and dialect (Official State portal). Situated in Eastern Himalayan region, it is one of the hotspot of biological diversity in India. As per official record, the richness of life forms i.e. the flora & fauna that occur in forests of Arunachal Pradesh presents a panorama of biological diversity with over 5000 plants, about 85 terrestrial mammals, over 500 birds and a large number of butterflies, insects and reptiles. The vegetation includes tropical forests, sub-tropical forests, pine forests, temperate forests and alpine forests.

The pressing problem is rapid depletion of biodiversity or loss of biological resources due to many factors notably, unsustainable deforestation, rapid urbanisation, environmentally hazardous developments, lack of sound planning, effect of climate change, growing corruption, above all ecological landscape wherein human lived in harmony with nature as a steward or caretaker of nature's wealth like forest, mountains, rivers etc stands totally compromised by greed of man and lack of concern and love manifested by their forefathers towards nature reported by Egam (2015). The cut throat commercialisation and illegal trading of bio-resources for profit without any concern for sustaining the nature is a grave problem today. The State of Arunachal Pradesh has just woken from a deep slumber in relation to loss of biodiversity but the question remains whether enough corrective measures are taken to arrest the further depletion.

This is primarily a discussion based paper about an integrated project to rejuvenate a depleted watershed and regeneration of forest undertaken by a unique model of nature's conservation called EB Project Nature. Conserving biodiversity would require partnership between government, society and corporates. It ought to be people and community led endeavour with adequate legal and policy supported by government and Corporate social responsibility as the basic principle. It is a well-established fact that Traditional Knowledge (TK) of a specific community has played a key role in conservation of biological diversity in history of mankind. The paper shall also factually report the critical role of TK in this regard. It is true that modern changes has also impacted TK and it is also fast fading away due to discontinuance and contemporary way of life. Biological diversity and TK has a close nexus, both are essential for ecological harmony by Verma (2007).

Statement of problem

1. Massive shifting cultivation in and around Bolen spring shed over several years dried up the catchment area.
2. Severe water scarcity in dry months between January to April.
3. Lack of irrigational water for wetland rice fields.
4. Loss of biodiversity and endangered wild species.

Methodology

The study involved survey of existing literature, field visit, first- hand information, legal and policy analysis etc. The area of study was Bolen Spring shed, Soi village, District Leparada, Arunachal Pradesh.

To observe and study the integrated project at Soi village to rejuvenate the dried Bolen spring shed, conserve biodiversity and to preserve rare and endangered bio resources indigenous to the region.

Intervention made by the EB Project Nature

1. Spring shed recharge through rainwater harvesting and regeneration of forest.
2. Stopping shifting cultivation and deforestation at spring shed area.



3. Finding alternate source of income for the villagers

Execution of plan

1. Pit digging started in 2011 with initial target of 1000 pits.
2. Pit size (average) 2×1×1 cu.m (2000 Lt.) depth of 1 m maintained to avoid drowning of animals.
3. Master pit of size 15×2×1.5 cu.m was dug at lowest point. The purpose of master pit was to collect overflows from all pits above.

Value addition in forest

1. Orchid conservation and beautification of spring shed forest.
2. Established an orchid park or Orchidarium in the forest vicinity for orchid conservation.
3. Above 70 native plant species conserved till date.
4. Plantation of important multi-purpose trees as medicinal plants and animal food.
5. Promotion of eco-tourism by regulated eco-trails and forest walk.

Indigenous rare and endangered plant species being conserved by EB Project Nature

The project is a unique initiative combining the ethos of wholesome environmental conservation of spring shed for water, agricultural revival, conservation of biological resources and sustainable economic livelihood for the village people. An example of an ideal integrated nature planning and execution. About 5000 number of native or wild fruit bearing plants and medicinal plants has been conserved at spring shed forest. Above 70 species of native orchids are conserved which includes very rare and threatened species. The table below contains information on some of the rare and indigenous plants identified and conserved by the EB project nature. Many of them are endemic to the project area and also collected from other parts of Arunachal Pradesh. Hence, both *in situ* and *ex situ* conservation was adopted.

Traditional folklore & forest conservation

Galo tribe of Arunachal Pradesh are very social,

maintains close clan and kinship ties, proud of their culture and traditions. Majority of Galo follow animism (worships nature) called 'Donyi-Polo' means Sun and Moon by Gumpi (2021). The traditional beliefs of Galo have close connection with nature and forest. They depend on forest for all their basic necessities—food, housing, animal, meat and cultural rituals. Galo folk lore based on trees stand tall in EB project nature as an evidence to show how folk legends contributes towards conservation. Every tree has its significance for Galo, for example Hwlum tree (*Canarium strictum*) with tumor laden parasitic plants on it is called Hwb Rvkpo in Galo means 'the valued male pig' of the forest God, hence tree is considered sacred and abode of the forest God, even pointing fingers at the tree is considered a sacrilege and tree is never harmed. In Galo folklore it is believed that Yapom (evil spirit) reside in some forest and if Yapom is unhappy with someone then they take that person to the forest and vanish him. Galo do not dare to do anything that may displease Yapom spirit like cutting down trees belonging to Yapom's by Jamir (2000). Traditional beliefs and practice system and cosmic harmony have deep connection. Sacred wood like Joli at Gori village is largely left alone by the villagers as abode of Yapom (Gokhale 2021). As per folklore if an outsider takes anything from Joli forest Yapom gets angry and some misfortune will befall on that person. As per Galo folklore people should not urinate or defecate in forest belonging to Yapom spirit as it will antagonise the former and vanish the culprit! Village people avoid doing cultivation in these sacred grooves called Rigra in Galo due to fear of Yapom and leave it undisturbed. Similar kinds of stories are found in many other sacred grooves in north east.

RESULTS

The traditional agricultural practice of Galo had been 'Jhum' or shifting cultivation decades back but the percentage has reduced considerably. Even those owning huge landholding did both wet rice cultivation as well as *jhum* for its multi-cropping benefits where all varieties of traditional crops needed at household could come in one basket. The *Jhum* fallow period was also longer initially between 10-15 years that decreased gradually (Tonyir 2022). There have been several studies conducted on



Table 1

Sl. No.	Indigenous name/ wild variety	Scientific name	Areas/location	Characteristics and uses	Traditional Knowledge associated
1.	Liiba, Taktwr, Tarak (Galo language) ¹	<i>Garcinia pedunculate</i> (Liiba), <i>G. Xanthochymus</i> (Tarak), <i>G. Lanceifolia</i> (Taktwr),	Leparada & other districts.	Acidic fruit, used to treat gastrointestinal disorders & liver ailments, used as fruit (by Galo) and other delicacies.	Used in folklore medicine at Assam, Galo tribe equates beautiful girl's red cheek with <i>Taktwr</i> .
2.	Dwkaa in Galo, Menangmanba-shi in Monpa language	<i>Gymnocladus assamicus</i> (Himalayan soap pod tree)	Tree is endemic to the Eastern Himalayan region of northeast India.	Important food for wild animals like deer and wild boars.	Traditionally used as soap in olden days by tribes, it is also a traditional hunting tree & in ritual.
3.	Pecha (Wild apple) in Apatani tribe	<i>Docynia indica</i>	Found in Ziro valley and in many other parts having similar climatic and geographical conditions.	High antioxidants, Commercial wild apple wine by name of Naara-aaba.	Tree used as firewood traditionally.
4.	Yabing (in Apatani) (medicinal bamboo)	<i>Schyzostyichum fuchsianum</i>	Found in Ziro valley and in many other parts having similar climatic and geographical conditions.	Shoots were cooked and eaten to cure dysentery, sharp split bamboo used to cut placenta of newborn, has antiseptic properties.	Traditional medicine of Apatani, used for hunting purposes and to purify water.
5.	Tayir in Galo (mountain pepper)	<i>Litsea cubeba</i>	Found in many parts of Arunachal Pradesh.	Medicinal properties and antioxidant to cure diabetes, cold, arthritis, asthma, essential oil etc.	Traditionally used for curing gastro-intestinal ailments, used in food as an herb. Due to destructive wild collection by chopping down the entire tree to collect the tiny sized fruits with branches, it is on the brink of extinction.
6.	Nyigam Baak in Galo	<i>Solanum torvum</i> or pea egg plant or turkeyberry	Found in many parts of Arunachal Pradesh.	A local vegetable. Medicinal properties good for diabetes having promising multidisease resistance traits.	Traditionally used as side vegetable by Galo and other tribes.
7.	Tader/Tadvr in Galo similar to	<i>Nephelium lappaceum</i> or Rambutan or wild litchi	In Leparada district and other parts of Arunachal Pradesh.	An exotic fruit. Seed of rambutan fruit contains important bioactive components.	Used as fruit traditionally.
8.	Hwlum, Hwgum, Hwri in Galo means big trees	<i>Canarium strictum</i>	In Leparada district and other parts of Arunachal Pradesh.	A straight tree. An important resin- yielding medicinal tree. Resin is used to treat rheumatism, asthma, venereal disease etc.	Traditionally Hwlum is a hunting tree, hwgum and hwri are used in house construction. Hwb Rvkpo or tumor like big lump on tree is Considered very sacred in Galo traditional systems, trees are considered abode of forest God.



9.	Rebap bapse in Galo wild grapes	<i>Tetrastigma planicaule</i> (syn. <i>vitis planicaulis</i>)	Native species. May be available in many parts of Arunachal Pradesh.	Yellow-orange fruit sour in taste. Favorite food for civet.	Traditional hunters' fruit to attract animal.
10.	Tapvr-pvrtv in Galo or oak plant	<i>Quercus spp</i>	Found in Leparada and other parts of Arunachal Pradesh.	Acorn or nut of this plant is important food for wild animals.	Traditional food of wild animals.
11.	Kobu mvku wild creeping cucumber Kobu means rat in Galo	<i>Solena sp</i>	Found in Leparada and other parts of Arunachal Pradesh.	Round bright red with tiny dots, sweet, delicious & medicinal,	Eaten raw by Galo.
12.	Talv mvvb in Galo	<i>Trichosanthes tricuspidata</i>	Found in Leparada and other parts of Arunachal Pradesh.	Red ball snake gourd, Poisonous, not eaten, has important medicinal property.	Traditionally Galo made poisonous arrow for hunting purpose.
13.	Tit baalo in Galo or fragrant caper vine	<i>Stixis suaveolens</i>	Found in Leparada and other parts of Arunachal Pradesh.	Fruits are edible. Has medicinal properties.	Traditionally called Rogne tit baalo & Rokpo tit baalo, later is rare.
14.	Sibi takung (in Apatani) or Monkey's peach	<i>Elaeocarpus serratus</i>	Ziro valley and in many other parts having similar climatic and geographical conditions.	Favourite food of monkeys.	Not eaten by local tribes.
15.	An-tarw (in Apatani) or wild kiwi	<i>Actinidia callosa</i>	Found in Ziro valley. Claimed to be native to China and India i.e Eastern Himalayan.		Local wine is prepared.
16.	Samper in Apatani, Hichir in Galo	<i>Phoebe cooperiana</i>	Found in many areas of Arunachal Pradesh.	Tastes like olive, a costly food item.	Traditional Galo delicacy
17.	Bulum in Galo or wild apple	<i>Docynia sp.</i>	Found in Leparada district and other areas of Arunachal Pradesh.	Bitter in taste, eaten by deer.	Traditionally believed to be food for deer.
18.	Taglam in Galo	<i>Sterculia lanceifolia</i>	Found in Leparada district and other areas of Arunachal Pradesh.	Eaten as fruit, Immune boosting, anti-cancer properties.	
19.	Kolu, kodok, kodum & kortw/kortii in Galo wild banana species	<i>Musa spp</i>	Found in Leparada district and other areas of Arunachal Pradesh.	Eaten as fruit and vegetable both.	Kolu, kodok, kodum are eaten and also fed to pigs, soft inner pseudostem of kolu is cooked with meat during feasting and considered a delicacy. Kortw is regarded as sacred and not harmed by Galo tribe.
20.	Mootum take (Galo) or wild ginger	<i>Zingiber mioga</i>	Found in Leparada district and other areas of Arunachal Pradesh.	Important ingredient in Japanese cuisines, it has anti-diabetic, anti-obesity and anti-cancer properties.	Lack of awareness about its uses locally, hence cut down and burnt in jhum cultivation.



21.	Tarv in Galo	<i>Calamus flagellum</i>	Found in Leparada district and other areas of Arunachal Pradesh.	Also, eatable, used in furniture, handicrafts, local basketry, fence, rope, traditional hanging bridge.	Due to its commercial use there is large extraction from forests. Habitat loss by deforestation and overexploitation is threatening the species.
22.	Enchee and Empum in Galo	<i>Sauraula armata, sauraula napaulensis</i>	Found in Leparada district and other areas of Arunachal Pradesh.	Sweet aromatic fruits eaten by both human and animal, it has anti-cancer, anti-diabetic and anti-oxidant properties.	Enchee is integral part of Galo traditional marriage and in Mopin festival.

*Source: EB Project Nature. This table comprises only some of the rare and endangered indigenous species out of several hundreds under conservation. The list is not exclusive only indicative. All respective indigenous names of the plant/fruits/tree are not provided as every tribe has their local nomenclature for the same.

positive and negative effects of shifting cultivation in north east India attributing reduced fallow period as reason for deforestation (Maoginla 2019). The EB project Nature's strategy was to ween the people of Soi Village doing shifting cultivation at the vicinity of Bolen Spring shed by providing some other alternative avenues. Hence, a composite plan with multi-pronged strategy was launched that would tackle water crises, forest regeneration at Bolen Spring shed, conserve biodiversity by both *in situ* and *ex situ* preservation of rare and threatened plant species, restore animal food by special plantation in project for conservation of animal. Another key objective was to help the people of Soi village dependent on *jhum* cultivation to opt for alternative livelihood which was ecologically viable and sustainable. The outcome of the project can be summarized as follows—

1. Besides generating much needed conservation awareness, the forest in the spring shed areas has been restored completely. About 27 Ha at the core catchment area has been turned to medium dense forest. The project has also maintained 2 Ha of protected dense forest. Successful conservation of roughly above 100 Ha of forest in adjoining areas of the project site where shifting cultivation has been totally banned for future water security (Vishal, 2005).
2. Restoration of forest biodiversity has led to increased wild life in the area due to availability of plants and fodder. The World Wide Fund for Nature-India (WWF) camera trappings has shown presence of barking

deer, Asiatic black bear, porcupine, Asiatic wild dogs (Dholes), wild boars, Civets, squirrels and others animals. Birds spotted are Crested Serpent Eagles, Kalij Pheasants and red Indian jungle fowls besides many other birds like Oriental fly catcher, Drongos, Laughing trush, Woodpeckers, Hornbills and other seasonal birds like Mountain Imperial Pigeon.

3. Project took help of former local hunters in identifying several food and fruits eaten by the wild animals, hunters turned conservators. Seedlings were collected, nursery prepared for seeds and later re-introduced in to the forest (*in situ*) as a result above 24 species are conserved main reason for increase in wild life population and effective banning of hunting, hitherto a traditional practice of Galo.
4. Established orchidarium and Orchid Park inside the spring shed. Rare and endangered orchids were collected from trees felled for *jhum* cultivation and from cleared forest at highway construction sites and conserved at orchidarium and later planted in Orchid Park. More than 67 native orchids has been saved such as *Anoectochilus roxburghii*, *Dendrobium sulcatum* and *Dendrobium densiflorum* and others.
5. More than 24 native species are conserved in the springshed area including rare and endangered plants, native fruiting species and medicinal plants like *Paris polyphylla*. Many native plants were identified based



on some traditional knowledge of the village elders.

6. Promotion of sustainable eco-tourism for nature enthusiasts, conservationist, researchers, animal and bird lovers, wild life photographers, filmmakers etc in a regulated manner without compromising the ecological state. Many youths of Soi village and former hunters are earning handsome from the given facility by being a guide and hospitality services to the tourist.
7. Inspired by the success of the EB project, the Government of Arunachal Pradesh announced provision of ₹ 5 crore in Budget 2019-20 to revive 20 numbers of drying spring water sources across the state.
8. EB project has entered into partnership with Jal Jeevan Mission, Arunachal Pradesh in 2022 for training stake holders, government functionaries on integrated spring shed rejuvenation, providing advanced conservation training, community capacity building, combining eco-tourism with water conservation at catchment areas (Lianzela 2009).
9. The project was invited by National Task Force, Jal Jivan Mission Govt. of India and Ledum Butterfly and Bio-diversity Meet-2019 for sharing the Project's experiences and good practices.

DISCUSSION

The results of the EB project can be analyzed from different perspectives. The problems identified were all inter-connected to one another, therefore an integrated approach as adopted was indeed the best solution no doubt. The problem of dried Bolen spring shed was due to unabated jhum cultivation in and around the spring shed area leading to deforestation, loss of biodiversity compounded by unsustainable use of forest resources by people like commercial exploitation of wood, plants and other resources with no conservation ethos (Sam Gray *et al.* 2020). The modern form of economy has had a debilitating effect on tribal traditional lifestyle also is a harsh reality today. The ethos of our ancestors to preserve the forest in its pristine form is no longer shared by the younger generation

who believe in making quick returns rather than opting for something that will test your conviction, perseverance and patience (Gomar 2022). In this backdrop, the feat achieved by EB project Nature will be one of the greatest stories of human conservation tryst led by a visionary young man in the history of natural conservation for all times. The biggest impact of the project has been on the outlook of the community living there who has taken to their heart the unbreakable bond of water and forest as the basic unit of life (Craig 2002). The EB project has amply demonstrated how water and forest work in synchronization and in natural symphony and the rest are derivatives. EB project nature makes efficient use of both data science and traditional knowledge in identifying the environmental and human causes of the problem and in presenting solution. As per Head of the Project, total 100 Ha forest has been saved with three sacred grooves in different location of Soi and Gori Village namely, Lep dumpo More, Kodum Paapuk and Joli Sacred grooves.

The narrative of water and forest is life and life not limited to human but includes all biotic and abiotic life is profoundly demonstrated by the EB project. However, it would require collective effort of community, State, NGO, nature conservationist to replicate the project far and wide. Only then India can boost of top performer in biodiversity index in the world. Sad fact is all International biodiversity conventions or treaties are only paying a lip service to conservation of biodiversity lacking any legally binding obligations or any sanctions for violators (Tomo 2022). National legal frameworks lack effective enforcement mechanisms and suffer from implementation challenges. EB project offers a perfect community model or a grassroot model, practical, viable, implementable and rooted to age-old traditional wisdom of forefathers, a novel idea that germinated from the grassroot reality. Hence, it proved to be a success even without any governmental support or funding at its inception (Architha, 2018).

CONCLUSION

The EB project has been quite impactful at the policy level as well as socio-economically besides its great ecological contribution. The much-awaited partnership agreement between EB project and



State Jal Jeevan Mission for revival of river and spring shed water in other fragile areas is one of the direct outcomes of the EB project (Gaston 2008). The NABARD has funded a project on spring shed rejuvenation at Joram village in Lower Subansiri district based on EB project model. Another project underway in Kanubari, Longding District of Arunachal Pradesh on spring shed rejuvenation is also attributed to EB project success. Many adjoining villages like Gori, Nyigam, Piri, Sago also have strong potential to replicate the project specially under the active involvement of a well-known local NGO called Gumin Rego Kwilaju (GRK) at Basar which is responsible for imposing a ban on hunting and fishing in river in whole of Basar besides undertaking various community-based services (Mehk 2007). The project has shown good results in a short span of six years as per report by the year 2017 Bolen Spring shed was sufficiently recharged and water availability revived the wet rice cultivation at Soi village. The Jhum is still practiced by some family in Soi and Pagi village but not in the project area of spring shed as this is the main source of potable water for the entire village and the people have realized its importance to conserve the Spring shed. To encourage the people to take up other viable vocation, through the intervention of EB project, fishery and chillie cultivation by women's Self-help Group at Soi and Gori village was facilitated by the project and shown good outcome. The project has drawn keen interest of people and its future plan is to promote sustainable eco-tourism in the region that will create economic avenues for the unemployed youths and bring other income benefits to the villager from tourism. However, the challenge will be to ensure that tourism does not harm the fragile ecology and reverse the process of natural conservation. In this regard, a strict vigilance mechanism needs to be devised in the form of a binding community protocol prescribing high penalty for violators. Also, flow of tourist in the protected area of the Project should be limited with strict dos and don'ts in tune with the ethos of conservation of plants and animals. The role of community and NGOs such as GRK will be crucial in this matter (Kharkongor 2017). At the villages, Biodiversity Management Committees (BMC) can be established as mandated under the Biological Diversity Act 2002 and the Biodiversity Rules and they can perform the role of biodiversity sentinels

and conservers and they should be imparted training to prepare People's Biodiversity Register (PBR) wherein important biological resources and traditional knowledge on biodiversity can be recorded and a strong database of bioresources can be created. The principles of prior informed consent and equitable benefit sharing is a well-established legal norms in relation to Biodiversity legal framework both internationally and nationally post Nagoya Protocol and it must trickle down to the community as an incentive for biodiversity management and conservation activity involving them (Edward, 1985). It is critical to impart proper training to relevant community about the science of conservation and to check the illegal trading of wild life or bio-resources which is rampant in biodiversity rich State of Arunachal Pradesh. The EB project is a fine example of community-oriented nature conservation model where people could see the benefit of the novel conservation effort within a short span of six years.

ACKNOWLEDGEMENTS

The author is indebted to Shri Egam Basar, Head EB project nature for all the necessary help provided in this research. His contribution has been immense and invaluable. All relevant data and information are directly obtained from Project Head. The author would like to thank every team members of the project. Author is also grateful to all the researchers whose work has been referred here.

REFERENCES

- Architha, N. 2018. Domestic Biological Diversity and ABS Laws, Policies and Practice in India. In A Primer on Biological Diversity Laws, Access and Benefit Sharing ed. M K Ramesh *et al.*, Bangalore: UNDP & CELERA, NLSIU.
- Arora, N.K. 2018. Biodiversity conservation for sustainable future. *Environ. Sustainability*, 1: 109–111.
- Craig, M. 2002. Strategies to Protect Biological Diversity and the Evolutionary Processes That Sustain It, *Systematic Biol.*, 51(2): 238–254.
- Edward O. Wilson 1985. The biological diversity crisis: A Challenge to Science, *Issues in Sci. Techno.*, 2(1): 20-29.
- Farhana, A. Illegal trade of exotic flora rampant at Lakhimpur along Assam-Arunachal border, Northeast now.
- Gaston, K.J., Jackson, S.E. *et al.* 2008. The ecological performance of protected areas. *Annu. Rev. Ecol. Evol. Syst.*, 39: 89- 93.
- Gomar, B. 2022. Member of EB Project Nature, Personal Interview, 06/06/2022, Time 11 AM.



- Gumpi, N. 2021. Yapom Galo Lökkathain (Folk Tales of Tribes of Galo Arunachal Pradesh) Anuugya.
- Hiranmaya, S. 2020. Traditional beliefs as conservation tools: the Galo's of Arunachal Pradesh, eastern Himalayas, India, *Res. J. Life Sci., Bioinformatics, Pharmaceutical and Chem. Sci.*, **9**: 73-85.
<https://www.arunachalpradesh.gov.in/at-a-glance-2/>
<https://www.thecitizen.in/index.php/en/NewsDetail/index/3/15387/Rejuvenating-A-Forest-In-Pursuit-Of-Water--?infiniteScroll=1>
- Hutton J.M. and Leader-Williams, N. 2003. Sustainable use and incentive-driven conservation: Realigning human and conservation interests. *Oryx.*, **37**: 215.
- Jamir, S.A. 2000. Studies on plant biodiversity, community structure and population behaviour of dominant tree species of some sacred groves of Jaintia hills, Meghalaya, Ph.D. Thesis, North-Eastern Hill University, Shillong, India.
- Kamrul, H. and Rosa, M.B. 2021. Protecting Indigenous Traditional Knowledge through a holistic principle-based approach, *Nordic J. Human Rights*, **39**(1): 51-72.
- Kaul, R.N. and Haridasan, K. 1987. Forest types of Arunachal Pradesh – a preliminary study. *J. Econ. Taxon. Bot.*, **9**: 379–389.
- Kharkongor, B.M. and Tiwari, B.K. 2017 Sacred Groves of Meghalaya: A Review, *Int. J. Sci. Res.*, **6**(3): 2319-7064.
- Lianzela. 2009. Effects of shifting cultivation on the environment: with special reference to Mizoram, *Int. J. Soc. Econ.*, **24**: 785-790.
- Mark, P. The phonology and grammar of Galo “words”, Research Centre for Linguistic typology, La Trobe University.
- Mehk, C. 2017. NGO series: Gumin Rego Kilaju Heritage Conservation in Basar, Media India Group, March 6.
- Pakngu, L. 2016. People's Perception about shifting cultivation - with special reference to the Galo tribe of West Siang District, Arunachal Pradesh (India), *Int. J. Scientific and Res. Pub.*, **6**: 3-7.
- Sam, G. and Rauna, K. 2020 .Indigenous Governance of Cultural Heritage: Searching for Alternatives to Co-Management'26(10). *Int. J. Heritage Stud.*, **26**(10): 919-933.
- Tomo, B. 2022. Chief Engineer, PHED, Coordinator, State Jal Jeevan Mission, Personal Interview, 04/06/2022, time 11 Am.
- Tonyir, B. 2022. Personal interview, 01/01/2022, Time 10 AM.
- Vishal, G. 2005. Jhum cultivation practices of Nyishis of Arunachal Pradesh, *Ind. J. Trad. Knowl.*, **4**(1): 47-56.

