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2014-15 | Volume No.7, Issue 4



An ENVIS -Sikkim Publication On Status of Environment & its related issues

ENVIS SIKKIM NEWSLETTER ON FORESTS, ENVIRONMENT & WILDLIFE

Polygala arillata And its Uses

**Red Alert on White Rhododendron** 

Crop Impaction from a Common Myna

Lampokhari Wetland An outlook

Gurudongmar: A prime Nature based tourism destination

> CASFOS: The best days of my life

Important Bird and Biodiversity Areas of Sikkim

About Saramsa Garden

My-Eco-Story

News & Events

Shapi-Himalayan Tahr in Phimphu KNP North Sikkim

# Yartsa gunbu

Its prospect for Access and Benefit Sharing





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Hosted by Forest, Environment & Wildlife Management Department, Government of Sikkim



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**Apr-Jun Vol. 7, Issue 1** *Theme: Environment Event Special* 

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Cover photo: Harvesting of Yartsa gunbu in Dzongu Valley Photo by: Nima Lepcha, Forest Guard (KNP –Dzongu Range)

**Oct-Dec Vol. 7, Issue 3** *Theme: Cleanliness and Hygiene Special* 



# EDITORIAL MESSAGE FROM THE EDITOR



Leccommun

Sikkim, a tiny Himalayan State with a global posture of being one of the world's highest mountain ecosystems offers diverse natural and cultural significance. It has not only sustained the livelihood of many rural populace but also signifies its tremendous potential for economic explorations through ecotourism and various other sustainable developmental approaches.

The State government unequivocally and judiciously has harnessed the natural resource potential of the State and implemented policies that not only conserves but also propagates the natural heritage for long term sustenance duly realizing the need of the people. The impeccable approach of the visionary leadership of Shri Pawan Chamling, the Hon'ble Chief Minister of Sikkim for more than two decades has been an exemplary achievement in the environment front at the global stage.

Conserving and protecting our natural environment however has always been an ongoing process. It is achieved more significantly through awareness amongst people. Good publication does not just circulate information, it penetrates the public mind with desires and belief. Through this edition of our newsletter, we intend to bring some information on biodiversity conservation measures taken in the State of Sikkim for upkeep of our natural environment. In this edition you will also read about the events, news and articles from experienced foresters, scientists, and citizens as well. Hope you will find this edition interesting and enjoy reading it!

We greatly value your feedback and would love to hear from you.

Dr. Thomas Chandy, IFS PCCF- cum- Principal Secretary Forests, Environment & Wildlife Management Department Government of Sikkim

> Send your comments and suggestions to sik@envis.nic.in pccf-fewd@sikkim.gov.in

Plumbeous Redstart (Female) Courtesy : Karma Zimpa

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> Memencho Lake, East Sikkim Picture by: Nagendra Rizal, Range Officer



# Yartsa gunbu

Harvesting of Yartsa gunbu in Dzongu Valley Photo by: Nima Lepcha, Forest Guard (KNP – Dzongu Range)

# **Prospect for Access and Benefit Sharing in Sikkim**

Bharat Kumar Pradhan, Sikkim Biodiversity Board, FEWMD

he concept of Access and Benefit Sharing emerged during 1990s when the world leaders felt that many people or countries have benefited from the use of bio-resources and the associated age old traditional knowledge by developing various products such as pharmaceuticals, cosmetics, crop varieties and livestock breeds, etc. for personal use. Nevertheless, the real resource managers or the community people who have developed these knowledge system and preserved / conserved the bio-resources for thousands of years have not been benefited from these developments, either monetarily or in other ways, which could have been an incentive for them to motivate to continue conserving biodiversity and

sustaining the existing traditional knowledge system. This led to adoption of Convention and Biological Diversity (CBD) in 1992 which emphasized that the states have sovereign right over their resources. It primarily focuses on to facilitate access to genetic resources for environmentally sound uses and to take legislative, administrativeandpolicymeasures to ensure the fair and equitable sharing of benefits arising from use of bio-resources and associated traditional knowledge (Oli et al. 2008). The benefit sharing may be monetary or non-monetary which includes sharing of whatever accrues from the use of biological resources such as transfer of technologies, participation in the scientificresearchanddevelopment

of biological resources, etc. (Oli et al. 2008).

#### **ABS law in India**

In its effort to achieving the objectives of CBD, the Government of India enacted Biological Diversity Act 2002 and notified the Rules in 2004 with the three basic objectives: conservation biological diversity, their of sustainableuseandfairandequitable sharing of benefits arising out of the use of such resources and the associated traditional knowledge. The BD Act 2002 is implemented at three levels: national, state and local level by National Biodiversity Authority (NBA) based at Chennai, State Biodiversity Boards (SBBs) and the Biodiversity Management Committees (BMCs), respectively. All these three agencies are an autonomous and statutory body constituted under the provision of Section 8, Section 22 and Section 41 of the BD Act 2002 with specific powers and functions (NBA 2004). Of all these agencies, BMC has a very important role to play and the sustenance of the NBA and SBBs totallydependonthestrengthening of the BMCs.

#### India's experience on ABS

Even though ABS has emerged very recently, it has significantly helped communities in shaping ABS till date. Moreover, India is the only country that has dealt with more than 100 ABS agreements and over six hundred ABS applications till date.

One of such example is the case of Kani tribe from Kerala, who shared their traditional knowledge on the anti-exhaustion potential of Arogyapacha plant with the researchers from the Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI) formerly known as the Tropical Botanic Garden and Research Institute (TBGRI), Kerala. The Institute developed a drug called Jeevani from Arogyapacha plant and it then allowed a company to manufactureand distribute Jeevani in exchange for royalties. Now the Kani tribes share licensing fee and part of royalties on the sale of wonder drug Jeevani derived from the magical Arogyapacha plant.

#### **UNEP-GEF-MoEF-ABS Project**

In order to strengthen the SBB and BMC in the country, United Nation Environment Programme through Global Environment Facility has funded an umbrella project "Strengthening the implementation of BD Act and Rules with focus on its Access and Benefit Sharing Provision" to Ministry of Environment and Forest, Government of India (UNEP-GEF-MoEF-ABS Project) and is being implemented by the National Biodiversity Authority through State Biodiversity Boards in several states including Sikkim. Of the various objectives of the project, one of the key objectives is to have ABS agreements for some of the important bio-resources in each State.

Sikkim being very rich in biodiversity as well as associated traditional knowledge, we have lot of potential bio-resources that can be regarded for having ABS agreement. One of such bioresources that can be immediately taken into consideration is *Yartsa gunbu*.

# *Yartsa gunbu* – a wonderful organism and its importance

Yartsa gunbu (Ophiocordyceps sinensis; family Ophiocordycipitaceae) is an entomophagus flask fungus that feeds on the larvae of the ghost moth (*Thitarodes armoricanus*) and produces a fruiting body that emerges out from the head of the larvae in the spring or early summer of the following year. The body of the insect host is used by the fungus as substrate to form the mycelium, which is, finally converted into a sclerotium, leaving the exoskeleton intact. Nevertheless, to understand how the fungus infects the caterpillar needs scientific interventions.

Yartsa gunbu or Himalayan Viagra has a long history of its use in Tibetan traditional medicine as well as in Traditional Chinese medicine as a powerful tonic and aphrodisiac (Winkler 2010). The species is highly prized since centuries and still holds good price in internationalmarket. Over the past 10 years, its demand has increased substantially in the international market fetching a market price of US \$20,000 – \$40,000 per kilogram, for high quality material. Its collection and trade have improved the socio-economic status and the lifestyle of the people and have largely contributed in the revenue generation in some regions; however, in Sikkim, despite its wide availability, the resources are still untapped formally and are getting wasted; therefore, there lies huge potential for its sustainable exploitation.

In Sikkim, it is known to be distributed along 3800 - 5000 m asl covering an approximate area of 1900 sq. km. Its distribution is mostly confined to Lachen valley (Green Lake, Muguthang, Thangu valley, Lashar valley), Lachung valley (Dombang valley, Yumey samdong valley, Katao area), Dzongu valley (Tholung pass, Kishong area, Singho lake area) in north district and Rathong glacier along Indo-Nepal border in west district; nevertheless, some of the local people reported its collection from east Sikkim along the Indo-China border. Its collection and trade is not legally formalised in our State but there is no doubt about the ongoing informal trade. At present, 3 main groups of people i.e. Lachungpa, Lachenpa and Lepcha have access to the resources in Sikkim because Yartsa gunbu is mostly confined to north district which is restricted for outsiders; however, insignificant number of people from other group like Limboos and Nepalis too are benefiting from its trade in west Sikkim. These communities are selling their collected materials at throw away prices (Rs. 150 – 200 per piece or less than that)to the buyers from outside the state, due to the fear of getting caught and fined and also decaying of the collected materials.



Government policies on Yartsa gunbu in Sikkim

In order to have control over the informal trade and to prevent anomaly in its price, the Government of Sikkim have framed the Cordyceps sinensis Collection and Selling Rules 2009 through a Government Gazette Notification No. 265/FEWMD dated 01/07/2009. As per the notification, the collection of Yartsa gunbu will be doneonlybytheJointForestManagementCommittees (JFMCs) and Eco-Development Committee (EDCs) of theconcernedareaafterobtainingpriorpermission from the Forest, Environment and Wildlife Management Department (FEWMD); however, the notification restricts its collection from the National Park and Wildlife Sanctuary. The collected material will be sold ingovernment organised auctions; after deducting the expenditure incurred for the disposal of the collected raw material, the remaining amount will be shared on 25 – 75 percent basis between the government and the JFMCs/EDCs/VDF, which means 25 per cent of the amount will go in the FEWMD revenue and the remaining 75 per cent of the amount will go in the JFMCs/EDCs/VDF account to meet up the collection and processing charges and usufruct sharing.

#### Yartsa gunbu **and the Biodiversity** Management Committee

Although, Yartsa gunbu Collection and Selling Rules 2009 is in force in our state but its effective implementation have become a measure problem. The government is trying hard to legalise the commercial exploitation as well as streamline the trade of *Yartsa* gunbu, so that the primary collector/local people gets the real benefit out of it. At the same time, the local people are also very much interested in its collection and trade because the income generated from its collectiongoesdirectlytothelocalpeople.Nonetheless, the problem here is that the resources are available in the forest areas that are under the control of the FEWMD who are not wrong in making assertion that some amount generated from its collection and trade should go to the Government revenue; nevertheless, the local communities seems not interested in this proposal. They desire the Government to buy their raw material from them at reasonable price and sale it in Government organized auctions, which is not feasible at the moment.



# *Yartsa gunbu* – a wonderful organism and its importance

Although, Yartsa gunbu Collection and Selling Rules 2009 is in force in our state but its effective implementation have become a measure problem. The government is trying hard to legalise the commercial exploitation as well as streamline the trade of Yartsa gunbu, so that the primary collector/local people gets the real benefit out of it. At the same time, the local people are also very much interested in its collection and trade because the income generated from its collectiongoes directly to the local people. Nonetheless, the problem here is that the resources are available in the forest areas that are under the control of the FEWMD who are not wrong in making assertion that some amount generated from its collection and trade should go to the Government revenue; nevertheless, the local communities seems not interested in this proposal. They desire the Government to buy their raw material from them at reasonable price and sale it in Government organized auctions, which is not feasible at the moment.

At this juncture, instead of JFMCs/ EDCs, involvement of local BMC (formed for the purpose of conservation, sustainable use and documentation of the local biodiversity) will be more appropriate and can aid in effective implementation of the *Yartsa gunbu* Collection and Selling Rules 2009 as well as fulfilling the objectives of the Biological Diversity Act 2002. Being a statutory body, the BMC can assist the department in closely monitoring the harvest of *Yartsa gunbu* in addition to conducting survey, organizing auctions, etc. They can also levy reasonable fee to the companies interested in buying the *Yartsa gunbu* from their jurisdiction area, which will enhance their Local Biodiversity Fund (LBF) created for carrying out the biodiversity conservation related activities in their area. In return, they will ensure that the middlemen are not involved in its trade and the local communities get the actual price for their resources as well as the time and effort they have put in its collection.

#### Yartsa gunbu and its ABS prospect in Sikkim

Yartsa gunbu is a potential bio-resource that can be regarded for ABS agreement in Sikkim because it has several pharmacological properties, leading to development of new drugs, etc. For example, it is used as the primarycomponentinthemanufactureofpharmaceutical drug called Cordycepin (for treating breast cancer), Gilenya (for treating multiple sclerosis), etc. In addition many dietary supplements from Yartsa gunbu such as Cordyceps sinensis, Cordyceps supplement, Super Cordyceps in the form of tablet, capsules, powder, etc. is available in the national and international market. In India, several companies are involved in manufacture, supply and export of Yartsa gunbu based drugs, health care products, food supplement, etc., some of which are listed in the following Table:

SN	Company	Location
1	Mother Herbs (P) Ltd.	New Delhi
2	Navchetana Kendra Health Care Pvt. Ltd.	Delhi
3	GR Herbal Extractions	Madhya Pradesh
4	Kuber Impex Ltd.	Madhya Pradesh
5	Iriss Herbals	Utter Pradesh
6	Asmi International Pvt. Ltd.	New Delhi
7	Kai Hawaiin Nutrition	Jammu and Kashmir
8	Bio Tech	Gujarat
9	Unique Wellness Products	Haryana
10	Ishita Organics	West Bengal
N IN		1913

Habitat of Yartsa gunbu in Dzongu Valley Photo by: Bharat K. Pradhan

It is apparent that the Indian companies are buying the resources for manufacturing Yartsa gunbu based drugs and food supplements; however, in Sikkim, due to lack ofmutualunderstandingbetweenthegovernmentand the local communities on its collection and trade, the companies are not approaching the collectors directly, rather they are involving the middlemen who are making enormous income without putting any effort. Further, it is assumed that most of the resources from Sikkim are going to China because it is much easier to smuggle the raw material to China than to take it to the Indian companies that are situated infar north-western and the central part, thus compelling the local collectors to compromise with whatever price they are offered by the dealers/middlemen. On the other hand, no revenue is being generated for the state for its own resources despite putting several efforts on its conservation as well as streamlining its trade in the state.

Considering this loss to both, the government and the local communities, it is high time that both the parties develop a mutual understanding on its commercialization aspect. This will benefit either of them in a way that the local communities will get a licence to harvest the raw material and sell it in the government organized auctions without any fear. At the same time, the companies who are ready to buy the materials from Sikkim may take active participation in such auctions thus reducing the role of the middlemen thereby directly benefiting the local communities. On the other hand, revenue will be generated for the State and also, this may encourage the companies to set up Yartsa gunbu and other medicinal plant based pharmaceutical units within the State. It will have other advantages like local employment, direct trade linkage between the companies and the local communities, etc. which will aid the buyers (companies) and the sellers (local communities) to go for formal negotiation or ABS agreement thereby ensuring the fair and equitable sharing of benefits from the bio-resources that is being wasted till date, thus meeting one of the objective of the BD Act 2002.Nevertheless, the percent benefit share shall be governed by the ABS guidelines notified and published in The Gazette of India; Notification No. 612 dated 21 November, 2014.

#### Conclusion

*Yartsa gunbu* is highly priced in national and international market. It has lots of scope for access and benefit sharing in Sikkim but the need of the hour is to develop common understanding between the government and the local communities which will certainly benefit both the parties. The involvement of Biodiversity Management Committee will ensure the effective implementation of the *Cordyceps sinensis* Collection and Selling Rules 2009 and fulfilling the objectives of the Biological Diversity Act 2002 in the state.

However, there are certain things to be taken care of before going for its legal commercialization such as, framing the harvesting guidelines, to have proper understanding on the trade mechanism, learning the positive and negative experiences of the other regions, awareness generation, etc. This will help the government in effectively implementing the existing policies on the harvesting and trade of *Yartsa gunbu* in Sikkim, and our local people will certainly be benefited in the coming days like the Kani tribe of Kelara, through ABS mechanism.

#### Acknowledgements

I would like to thank Hon'ble Forest Minister Shri Tshering Wangdi Lepcha, PCCF-cum-PS Dr. Thomas Chandy and CF (T)-cum-Member Secretary (SBB) Shri Y. P. Gurung for motivating me to develop this article.

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# **POLYGALA ARILLATA AND IT USES**

Sanjyoti Subba\*1, Sanchi Subba2, Sumitra Nepal3 and MeenaTamang4



#### DISTRIBUTION

Yellow Milkwort (*Polygala arillata* Buch.-Ham.ex Don) belongs to the family Polygalaceae locally called 'Marcha plant' is to be preserved and conserved in naturalhabitatwhich havegreat cultural and traditional use practices of hill people especially by Limbu and Rai community for making fermented homemade alcoholic products. *P. arillata* is found in the Himalayas ranges from Nepal to Bhutan, S. Tibet, Ceylon, Burma, Indo-China, and Western Ghats growing at temperate evergreen forest and shrubberies along 1500 - 2700 m asl (Polunin & Stainton, 1984). In India, *P. arillata* has a wide distribution in Uttar Pradesh, Eastern Himalayan ranges, extending to Darjeeling and Sikkim (*www. flowerofindia.net*). In Sikkim, Yellow Milkwort is found growing intemperate forest normally well in cool climate with moisture rich soil nutrients. The temperate forest has high dominance of flora and fauna in Sikkim hill and is the most undisturbed, natural, virgin forests and rich biodiversity hotspot in the State. In Sikkim, it was discovered, this species is abundantly distributed in shady, moisture places mixed with *Castanopsis* sp, *Quercus* sp, *Magnolia doltsopa*, *Magnolia velutina*, *Magnolia cathcartii, Nyssa javanica, Daphniphyllum himalayense*,

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Photo: Overview of FambongLho Wildlife Sanctuary (East Sikkim)

*Exbucklandia populnea, Symplocos theifolia, Symplocos glomerata,* thick bamboo forests and most common shrub *Vibrunum erubescens* at FambongLho Wildlife Sanctuary in East Sikkim.

The geographical area of this Sanctuary is 51.76 sq.km and 20 km distance from the Gangtok. The place here is quite hilly where the elevation starts from 1500 m and varies from place to place. The highest peak in the sanctuary is Tinjurey at 2749 m asl. This Sanctuary is known to be a home for various species of wild animals and shelters the Himalayan black bear, red panda, civet cat, and many varieties of birds and butterflies. Sanctuary also has several rare species of flora including *Polygala arillata*, wild orchids and many other rhododendrons species.

#### THE FAMILY & GENUS POLYGALA

Among family Polygalaceae by tree, shrubs, herbs, and woody climbers comprises 21 genera and about 800-1000 species diversely distributed in American and African forest by (Eriksen & Persson, 2006). Banerjee 1993, mention the four genera and *ca*. 32 species of Polygalaceae occurring in India Sub-continent. Out of these, *Polygala arillata* is a large shrub which is distributed in Sikkim at temperate forest.

#### MORPHOLOGY

Yellow Milkwort is a large shrub growing up to the height of 4m tall. Bark is grayish-brown, branchlets sometimes weakly ridged, densely pubscent, terminal buds densely yellow-brown and felted-hairy. Leaves are simple, alternate, spiral and canaliculate in cross section. Inflorescence racemes, to 15 cm long, pendulous; peduncle to 3 cm long; yellow; petals 3, lower one boat shaped and the flowering period starts from the month of May to June. The fruiting period start from October to December. Seed colour brownred to black and globose. Ovary compressed globose, narrowly winged, and ciliate; capsule purple-red at maturity.





*Photo:* Flowering of *Polygala arillata* in FambongLho Wildlife Sanctuary (East Sikkim)



*Photo:* Fruiting of *Polygala arillata* in Fambong Lho Wildlife Sanctuary (East Sikkim).

#### **PREPARATION & ITS USES**

*Polygala arillata*Buch.-Ham ex Don (Polygalaceae)hasbeenusedasacompulsoryand effective ingredient of Marcha for fermentation considering the taste and intoxication capacity of alcoholic products. Marcha (yeast cake) is locally made and widely used fermentation starterinruralindigenous communities of Nepal, Sikkim and some parts of Eastern Himalayas by (Kundu, 2009).

The roots of *Polygala arillata* used to make yeast cake for fermented alcoholic product. Yeast cake is prepared by some amount of rice is soaked for 24 hours. Then, the soaked rice is mixed with little piece of red dry chilies with two pieces of root of *P. arillata* is added and to make a flour with the help of local made 'Okhali'. After that, the flour is make a paste with adding tape water than prepare cake and to kept for drying in fuel wood ceiling. After drying, the yeast cake is prepared to sell in local market @ Rs. 10 per cake. Afterwards, yeast cake is ready to use for making local fermented alcoholic product (Jaand, Roxi, Bhatti, Chhyang etc.) which have high demand in local market by consuming as casual and by people mostly used in occasion at wedding ceremony and funeral of Limbu and Rai community. Local made alcoholic product is organic product and high nutrient for consumption and the product is made by local or desi millet, wheat, rice, etc., and it's sold @ Rs. 40 per kg of Jaand, Bhatti and Chhyang. This species and its preparation of yeast cake and the local alcoholic fermented product of indigenous knowledgeareconservedandpreservedthrough sustainable harvesting practices in the state.

#### **CONSERVATION INITIATIVES**

The conservation initiative in Sikkim Himalayan Regionstartedforthe conservation of the species include banon grazing and sustainable harvesting practices by local communities. The conservation involves in two ways (1) in-situ conservation and (2) ex-situ conservation. In-situ conservation, the species protected within natural habitats where the protected area networks play significant role. It can be implemented by creating public awareness of the importance of the species and conservation of sanctuaries, national park and biosphere reserves. (2) ex-situ conservation, in botanical garden, high tech nursery, Smriti Van,



ban on commercial exploitation of medicinal plants, and t ban on felling of trees in different parts of Sikkim Himalayan region.

This species is conserved in natural habitat mostly in temperate forest of Sikkim Himalayan region. The ecological conditions and physiological factors existing in temperate forest are most favorable for the growth of *P. arillata*. Ecological diversity of *P. arillata* in addition with other species plays a significant role in the temperate forest. Restoration of *P. arillata* and their conservation in nature promotes the existence of other biodiversity.Immediateconservation and management approaches of valuable plants with the involvement of local indigenous people of Sikkim will encourage the sustainableconservationofbothbiological and cultural diversity.

The Sikkim Biodiversity Conservation and Forest managementProjectaimstoenhancetheglobal, social and economic value of biodiversity and improve the livelihoods of the people in and around our PAs and RFs which can be achieved through establishment and implementation of sound management plans and the dissemination of biodiversity information for promoting public awareness and the significance of biodiversity.

#### **AKNOWLEDGEMENTS**

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Excerpt from the Journal American Rhododendron Society 77:76-80

# *Rhododendron mekongense –* New Species Record from Sikkim Himalaya, India

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Fig. 1. R. mekongentse var. mekongenser A. Habitat. Photo by Johan Nilson, B. Habitat. Photo by Sabita Dahal. C. Influescence. Photo by Sabita Dahal. D. Winter bud. Photo by Johan Nilson.

Duringthefieldtrip(May–June2014) on arapidbiodiversity survey under Japan International Cooperation Agency (JICA) assisted Sikkim Biodiversity Conservation and Forest Management Project in Lachung Valley (Shingba Rhododendron Sanctuary (SRS), Yumthang Valley up to Shiv Mandir) in northern Sikkim, the survey experts from Stateforest department came across arhodo dendron species inside the SRS (about 3300 m elevation) which was completely different from other species encountered and described earlier from Sikkim.

The discovery of a new species, *R. mekongense* var. *mekongense*, from Sikkim suggests that extensive exploration in the unexplored areas of Sikkim may result in more species of rhododendrons and other plants being identified. The first written record about *R. mekongense* was by Franchet (1898); however, R.P. Soulie was the first person to record the species from the Mekong Valley in China in 28 June 1895. With the discovery of *R. mekongense* var. *mekongense*, Sikkim now has 38 species, eleven subspecies, eight varieties and two natural hybrids of rhododendrons.

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Fig. 1 *Rhododendron arboreum* var. *album* Picture taken on 5/4/2013

# **Red A Bri** on the White Rhododendron

### **Red Alert on the White Rhododendron**

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hree cases of sighting of Rhododendron arboreum with white flowers have been made in the region so far and in all the cases only a single individual is accounted. A reason for this could be it being a variety of Rhododendron arboreum; as most plants of the sub-specific and varietal ranks are usually not found in large numbers. Or in other words these are often naturally rare or "born rare". For instance, Rhododendron cinnabarinum grows profusely at places in the region whereas its variety, Rhododendron cinnabarinum var. royale, is rare and wherever found in the region (Tonglu, Kalpokhari and Phedang) constitute just a handful of individuals. However, coming across just a single plant every time at any location is somewhat a little intriguing in itself. It cannot be just a case of a "freak-of-nature" as because such a thing as nature freaking out usually happens as a one-time occurrence and do not keep on repeating everywhere.

#### The var. album

The plant is provisionally named as *Rhododendron arboreum* var. *album* (Fig. 1) alluding to its white flowers and other variant characters. This variation in flower color in *Rhododendron arboreum* is

an age-old and a thoroughly perplexing subject. Red is the common or the true flower color for Rhododendron arboreum and several shades of red are found at select locations and situations but the occurrence of white flowers is rather rare. This deviation towards white flowers is by far not the case in Sikkim Himalaya alone but the situation unveils elsewhere too (however, in each case "a single tree per site" keeps on repeating). The results obtained by different workers (Table 1) differ but in all the cases the description stands true because of wide color variation in the species and what exactly was observed in the field. The flower color is definitely not the consequence of natural hybridizationeither. It takes two different colors or species to make a third one, but for a white one it takes all the seven colors of the spectrum or unless the plant is a mutant. A red flower suddenly turning into white blooms, at a certain time and place, is an enigma of a sort and more work is needed to unfold the whole story. This plant could also be going through the intricate process of speciation and will take some more years to convert into a full-scale species. What we are seeing now could be a small act or a scene from the complete play.

Author	Description
Hooker 1851	Vermillion, deep red, inconspicuously white
Gamble 1922	Crimson but may vary through different color
Hara 1966	Crimson, deep rose, rose or rarely white
Ohashi 1975	Crimson and its different shades
Polunin & Stainton 1979	Blood-red, pink to white
Chamberlain 1982	Bright red to carmine, rarely pink or white
Pradhan & Lachungpa 1990	Blood red to scarlet and variable, rose to white

 Table 1. Corolla color interpretation of R. arboreum by different workers



From the map locations it is clear that the plants do not follow any visible effect of latitudinal influence too and the altitudes also vary among the three habitats. These show that latitude and altitude have no role what so ever in inducing the color change. However, all the three habitats follow south-east aspect and always grow a little far removed from the rest of the rhododendrons in the area. It generally prefers a light shade under a sparse upper canopy rather than growing in the wide open as do *Rhododendron arboreum*. The undersurface is silvery white (Fig. 2) making it not belonging to *Rhododendron arboreum* var. *cinnamomeum* either. In essence, a large number of discrepancies provide enough justification for this plant to veer away from its parent species *Rhododendron arboreum*.

Hooker's pioneering work *The Rhododendrons of Sikkim-Himalaya* (1851) does not throw much light on this situation suggesting that he himself did not come across it at any time during the expedition. An opinion put forward by Polunin & Stainton (1979) explains it as "flowers blood-red, pink to white ... the latter usually found at higher altitudes". The statement given, however, does not hold much water as the ground truthing tells a different story (Fig.3) and the opinion in it also antagonizes its varietal status. Advancing the altitudinal attributes for its white flowers would greatly destabilize its taxonomic status. The plant shows undoubtedly clear characters of sub-specific taxon with distinct morphological signature of its own. The question of it being *Rhododendron arboreum* var. *album* or not may be settled in due time and with luck a new taxon could beadded for the region. And till then, what ever the case may be the above enigma of what-is-what and lots of other issues are open for review.



Fig. 2 R. a. var. album leaf undersurface clearly differs from that of R. a. var. cinnamomeum





Fig. 3 Site record of R. arboreum var. album in Sikkim Himalaya

#### **Pressing Ctrl+S**

Presence of 3 individuals only from the entire Sikkim Himalaya is a cause of concern. This state of affairs also provides the ground for the plant to be listed under CE for the region. The seemingly dire straits that it is facing at the moment ask for urgent conservation measures to be seriously mulled over. It has been found that multiplication through seeds is successful (T.D. Lachungpa, Pers.Comm.) and though this variety produces much less fruits than Rhododendron arboreum each capsule bears thousands of seeds within, and this is enough material for taking action. Multiplication through seeds and other conventional methods at its respective habitats should be the first step towards its conservation. The single plant falling within Singalila National Park is officially conserved and doubly secure duetocommunityinvolvementalsobutsamecannotbe said for the remaining two. Involvement of local people in conserving the plants is found to be more effective than interventions coming from other guarters. And finally, the real good news is that the plant is still there, and we don't need more luck.

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# CROP IMPACTION REPORTED FROM A COMMON MYNA (*Acridotheres tristis*) IN GANGTOK, SIKKIM

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he common myna or Indian myna (*Acridotheres tristis*) also sometimes spelled mynah, is a member of the Sturnidae family. It forages on the ground among grass for insects, and especially for grasshoppers, from which it gets the generic name *Acridotheres*, "grasshopper hunter". It is a species of bird native to India but introduced in other parts of the world for control of pests. However, in 2000, the

International Union for the Conservation of Nature (IUCN) declared the bird among "100 of the World's Most Invasive species". The common myna is generalist, opportunistic omnivore, feeding on a wide variety of food. Dubbed as the 'garbage bird' because of its unseemly habits, myna birds flourish wherever humanslive, their populations booming around garbage tips, factories, schools, shopping centres and dumped



cars. Their presence may also have health implications for humans. Large roosts inside buildings can spread disease such as salmonellosis to people and can cause dermatitis and asthma because of the mites they carry (Thomas, 2004).

Last monsoon, I came across a myna with interesting morphology at Tadong, Gangtok. I monitored the bird for around a week after which I lost track of it.

On closer examination; the bird was quiet, solitary and disinterested in eating. Going through literatures and interacting with some experts, I learned that the myna had an impacted crop. It could also however be a tumour but since it could not be captured this speculation cannot be confirmed.

However, Diptheria and tumours can beruled out because in Diptheria, the lesions appear in the form of minute grayish pimples or blisters (which contain a straw-colored fluid) usually on the unfeathered parts of the fowl's body. The blisters later dry and drop off, revealing new and possibly scarred skin beneath. Avian tumours on other hand are: 1. Internal cancers - which occur in kidneys, liver, stomach, glands (ovary, testicle, thyroid and pituitary), muscles or bones. 2. Squamous cell carcinoma/ skin cancer -usually appears on the wing tips, toes, around the beak and eyes 3. Papilloma - a benign skin tumor, usually due to viral infection which occurs on the skin and in the stomach lining and 4. Fibrosarcoma -which occur in connective tissues, leg or wing. There are 574 species of bird in Sikkim (Acharya, B.K. 2008)

sometimes feel the contents whether they are food, grit or water.

Crop impaction is a problem with either the crop or the proventriculus (the first part of a bird's stomach) where food fails to move into from the crop. There are two potential causes for this obstruction; either there is a foreign body which is blocking the passage of food such as string/plastic, long grass or contaminated food (decaying table scraps etc.). Often nutritional



and there have been few reports of crop impaction in wild birds, unlike in domestic poultry and ducks.

The ingluvies (crop) is a food storage organ and in a healthy bird, the crop gets emptied completely overnight. The crop is a part of the oesophagus (food pipe) where the initial stages of digestion occur. The crop is found at the base of the neck where you can deficiencies either from inadequate roughage or diet and parasitic gastrointestinal infections are the underlying cause of the aberrant foraging behaviour of birds that leads to this type of impaction. This form of crop impaction is prevented by removing hazardous material from the backyard and in a way adjusting the diet.



The second possible cause can occur when the normal muscular contractions fail and movement of food is prevented from passing into the digestive system. Fluctuating weather conditions (e.g. sudden cold, wet or hot spells) are often involved with this type of crop impaction. Gizzard and crop impaction are also sometimes a consequence of ingesting toxins like Fumonisins toxins produced by Fusarium moulds (from contaminated food) which may cause proventriculus and gizzard malfunction, liver disease and bone abnormalities. This can also occur as a result offeeding maize, wheat and other cereal grains that are contaminated with this mould. These moulds are most active during warm wet weather of autumn and winter.

Impacted material in the crop can be softened by the administrationofwarmwaterfollowedbymassagingthe crop. However, ingluviotomy (a surgical intervention) will generally be the method of choice for removing impacted material. The treatment can involve giving the bird supportive care such as fluids and hoping that the problem resolves itself but ideally surgery under a local anaesthetic to remove the offending material followed by washing the inside of the crop with sterile saline is recommended. Treatment includes crop flushing, fluid therapy, force-feeding, warmth and antibiotics. Fortunately, the crop has a good blood supply and heals well.

My chance observation of this bird, a well adapted commensal of man, could well mean that its habitat needs some clearing up. Perhaps it was predated by a feral cat in its weakened state. Perhaps it just died unseen, un-loved by the humans who never noticed its free scavenging of their wastes. We need to realize that birds are considered to be good sign of environment cleanliness and they are being exposed to new, novel pollutants whose impact we don't fully understand.

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# OUTLOOK OF LAMPOKHARI ARITAR-DALAPCHAND WETLAND



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'Lampokhari Aritar- Dalapchand Wetland' is a promising ecotourism destiny of Sikkim having a potential of harboring trans-floral and faunal species of Neora Valley National Park of West Bengal, Pangolakha Wildlife Sanctuary of East Sikkim and Toorsa Strict Reserveof Bhutan. The global positioning coordination of horse shoe-shaped Lampokhari is at 27°11'11.93" N and 88°40'33.13" E at an altitude of 5034 feet. The altitude of this region varies from 2372 feet to 6430 feet under the revenue block Aritar-Dalapchand subdivision Rongli, East Sikkim. Out of 553 wetlands of Sikkim, it is ecologically significant habitat for the rare, threatened and endangered species.



Asitisclosetoeco-sensitivezonesofnearestPangolakha Wildlife Sanctuary, National Park and Reserve, this wetland of Aritar and its fringed villages are the habitats for many trans-border species. In particular, Pangolakha Wildlife Sanctuary is the only sanctuary having the habitat of Tiger in Sikkim. Besides, it fosters high valued bio-resources representing many families and some are yet to be explored across the Himalayan terrains. Lampokhari Aritar-Dalapchand watershed consists of the characteristics of all the three subregions, namely Himalayan Montane System, Indian Peninsular Sub-region and the Malayan sub-region. Four habitat types of Lampokhari Aritar- Dalapchand watershed are Subtropical Mixed Broadleaf Forest, Lower Temperate Evergreen Forest, Upper Temperate Mixed Broadleaf Forest and Rhododendron Forest. The vegetation includes Dry Mixed Forest, Wet Mixed Forest, Lauraceous Forest, Buk-Oak Forest, Coniferous Forest, Himalayas Moist Temperate Forest and *Rhododendron* forest. Way back to 19<sup>th</sup> century, this Himalayan belt was known across the globe as a potential area of high valued orchid species and floricultural species.

In retrospect, Lampokhari Aritar- Dalapchand watershed was a part of silk route, and was accordingly responsible for Himalayan and Rural Economies; it was in existence for several decades covering the then Tibet, Sikkim Bhutan and India, and was in existence until late sixties of 20<sup>th</sup> century. The then business hub of Eastern Himalayan belt passed through ridges and furrows of these Himalayas, and all the way through YaktungtoCalcuttatransectingmonumentalHimalayas of Padamchen Forest Range, Rongli Forest Range and Rhenock Forest Range. Besides, several surveys of Eastern Himalayas, International Explorer towards Tibet, Spiritual discourses etcetera were undertaken down the line. In addition, it was geopolitically significant during Anglo-Nepal war and its remnantsgraveyard of Anglo-Nepal warriors- still portray self-explanatory note.

#### **ISSUES TO BE ADDRESSED**

Addressing these issues shall strengthen stakeholders and promote responsible ecotourism across the Lampokari Aritar-Dalapchand watershed as well as to Sikkim as a whole. It shall also support to add-in Sikkim as a finest tourist destination for ecotourism.

- 1. Sensitization and awareness programmes on bioresource management and biodiversity;
- 2. Qualitative ecotourism management and upgradation;
- 3. Foodparkofbio-resources and ecotourism festival;
- 4. Education, Communication and Information to the stakeholders of Wetland Complex of Lampokari and Watershed of Aritar- Dalapchand;
- 5. Wetland Complex of Lampokhari and Watershed of Dalapchand –Aritar ought to develop for the sustainable uses of bio-resources and its management;
- 6. Habitat and corridor networking offlora and fauna;
- 7. Inventorization of bio-resources

#### **CONCLUSION**

The Lampokhari Aritar- Dalapchand wetland and watershed ought to develop and preserve for the bioresource conservation for sustainable livelihood of stakeholders. Awarenessandsensitization programmes across the area may enhance the development of biodiversity and lead to expansion of bio-resources. Such initiatives encourage developing and preserving aquatic and terrestrial ecological species at the Lampokhari Wetland Complex for the stakeholders for the promotional activities. Eventually, education, information and communication programmes, and such other expansion activities need to be upgraded for the identification of natural assets and physical assets.

Furthermore, Lampokhari Aritar-Dalapchand watershed is close to the international borders with BhutanatEastandChinaatNorth,andinter-stateborder with West Bengal. In the light of this, the projected area faces some challenges from several quarters for the biotic management. But, the visionary plan of State Government, dynamic guidance and supports have strengthened Lampokhari Aritar-Dalapchand watershed with scope to enhance, and it still deserve to grow more with prospective planning.



# Gurudongmar

### A Prime Nature Based Tourism Destination, North Sikkim

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#### Introduction

Structural shift in the economy of Sikkim has been made by the remarkable growth of services sector which also include nature based tourism, contributing the largest share to the Sikkim State Domestic Income (SSDI). Indeed, the contribution of service sector to the Sikkim State Gross Domestic Product (SSGDP) has increased by 20 percent in the past years (1980-81-2004-05). Thus, nature based tourism has emerged as a driving force, because it focuses on the conservation of the environment as well as supports the rural/ local economy. Owing to its increasing significance, Government of Sikkim in the last one decade had takenpro-poor, pro-community and pro-environmental initiativestodevelopcultural, pilgrimage and adventure tourism as well as village and home-stay tourism within the broader view of eco-tourism.

In fact, 85 percent of the geographical area of Sikkim is not available for cultivation (±15 percent only) and they are characterized and dominated by glacial, periglacial, *nival*, *pluvial* and fluvial processes. A range of scenic landscape is pervasive in the ecoregions of Tista, Sikkim Himalaya including forest, wetlands (lakes, glacier, river and streams), waterfalls and other associated features providing amples cope tothe growth and development of the service sector. The present study focuses upon the attractiveness and the recreational and religious/cultural services provided by the sacred lakes and mountain of Lachen sector, North Sikkim and the status of Gurudongmar wetland complex including geomorphological and geological interpretation. The individual landscape features have been playing a key role in promoting contemporary tourism. Masion (2003) reported, nature based tourism as the fastest form of tourism in the last decade or so. The prime nature based tourism destination in Lachen sector is Thangu, Chopta valley, Raja- Rani Pahar and Gurudongmar lakes and so on. The significance of the Thangu, Chopta valley and Gurudongmar lake to the domestic tourists and local visitors have been highlighted by several writers and scholars such as Rajesh Verma (2012), Yishey Doma (2011) Viva Arora (2009) Paul (2013) and Dahal (2014) as well as Tourism and Civil Aviation Department (T&CAD). Furthermore, Department of Tourism has recently installed 10 touch screen kiosks within and outside Sikkim with a vision to provide proper and accurate information on the Himalayan state of Sikkim.



#### **Gurudongmar Lake**

Gurudongmar literally means 'The Red Faced Guru' and sounds similar to 'Guru Dragmar' which means the redcolouredwarmthfulformofGuruPadmasambhava. It is located at 28 02' 07.88" N latitude and 88 42' 44.36" E longitude at an altitude of  $\pm$  5148 m in the upper catchment of Tista. The lake is combination of three large water bodies (marked as A, B & C on Google Earth Image, 2014). The outlet of the lakes is towards NNW direction. The melt water of the lake is one of the source of *Chhombo Chhu (= river)*. The lakes have been nourished by a vast névé field and the glaciersdescendingthroughKhangchengyao (6, 889m), Yulhe Khang (6,405m), Gurudongmar (6715m) and Sanglaphu (6,078m) mountain peaks into the valley. Owing to climatic amelioration, some of the hanging glaciers feeding the lakes have been completely

detachedowingtoapparentretreatoftheglaciersunder the stress of contemporary climate change. Both, relict and *contemporary* geomorphological features have been well preserved by the retreating glaciers in the Gurudongmar area in the recent past, leaving a rich legacy of glacial phenomenon in the region. The three waterbodiestogetheroccupiesanareaof3.34km<sup>2</sup>lying inaboat-shaped depression created by scooping action of the glaciers and ice in the past (Fig.1). Gurudongmar lake has been declared sacred by Government of Sikkim vide Gazette Notification No. 244, in the year 2006. The lakes are encircled by the mountain peaks of Khangchengyao (6,889m), Yulhe Khang (6,405m), Gurudongmar (6,715m) and Sanglaphu (6,078m) and held sacred by Hindus, Sikhs and the Buddhists of Sikkim. The prayer flags fluttering in the vicinity of the lake signify its sanctity.



Fig. 1. Gurudongmar lakes encircled by Khangchengyao (6,889m),Yulhe Khang (6,405m), (Gurudongmar (6,715m) and Sanglaphu (6,078m) mountain peaks.

LLM = Left Lateral Moraine, RLM = Right Lateral Moraine a = region of alimentation b = region of drainage (Image Source: Image © 2014 CNES/Ausrium © 2014 Mapabc.com ©2014 Google) retrieved on 31/10/2014).





Fig.2. Geological map of Gurudongmar area. The structural features (fault, thrust etc.) in the geological map have been taken from the Geological map of Sikkim prepared by GSI in 2012.



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Geologically and structurally, the region falls within the domain of *Tethyan* formation comprising of limestones, shales, ferrogeneous – quartzites and slate etc. The lithology of the Gurudongmar region is characterized by banded, streaky migmatite, augen biotite gneiss, biotite muscovite gneiss, boulder bed, fossiliferous limestone and sandstone, fossiliferous limestone with quartzite. The rocks are highly jointed and fractured. The dip of bedding of the rocks in the region is towards NW direction (Fig.2).

In fact, the sacred lakes have been able to attract a large number of domestic tourists annually. Owing to its aesthetic beauty, the flow of domestic tourists to the lake has increased tremendously. In 2006 and 2007, a total of 24,670 domestic tourists have visited Gurudongmar lake. The statistics showing increasing area of the Gurudongmar lakes are in (Table 1). The yearly variation in the number of visitors to the lake is in (Table 2). The best months to visit the lake are March, April, May, October, November and December. Additionally, domestic tourist has to obtain Restricted Area Permit (RAP) pass and Protected Area Permit (PAP) to visit Gurudongmar lake, North Sikkim because of its strategic location. As per Shrestha *et al.* (*n.d*) annually 15,000 tourist visits the Gurudongmar lake to enjoy the aesthetic beauty as well as to fulfill to their wishes.

Name of the lakes	Altitude (m)	1965	1976	1989	1997	2000	2005	2010	2014
Gurudongmar -A	5174	1.048	1.099	1.099	1.099	1.104	1.115	1.134	1.152
Gurudongmar- B	5253	0.249	0.322	0.925	1.046	1.046	1.073	1.076	1.109
Gurudongmar- C	5218	0.480	0.687	0.718	0.728	0.732	0.745	0.745	0.950

Table 1.	Area of the	Gurudongmar	lakes between	1965-2014	(area km <sup>2</sup> )
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Cf: Kumar and Prabhu, 2012 [1965-2010]; 2014 [present study]

The significant increase in the area of the lakes can be ascribed to rapid deglaciation under the stress of contemporary climate change. The floating ice needles on the lakes, increased in area and exposed morainic loops gives a clear evidence of melting, *glacial-ice calving* and a rapid retreat of glaciers in the region. Decaying of a vast *névé* field extending through Khangchengyao (6,889m), Yulhe Khang (6,405m), Gurudongmar (6,715m) and Sanglaphu mountain peaks can also be ascribed to change in snowfall pattern in the region.

Table 2.	Domestic	tourists	visiting	Gurudono	gmar lake	between	2006-2007
			· · J				

Parameters	2006	2007	Places of attractions	Attractiveness
Total Mean SD	10498 197 243	14172 1181 1457	Thangu, Chopta valley, Raja- Rani Pahar and Gurudongmar lakes(marked as A,B & C)	Sikh temple, dynamic human-nature interaction, pristine water of the half frozen lake, floating <i>ice needles</i> , visual appearance of the mountain peaks on lake water, vast stretch of alpine <i>bugiyal</i> and yak grazing, snow covered peaks, U-shaped trough, hanging glaciers, cols, arête, as well as bird's eye view of cold desert (a part of Chholahmo plateau etc.



#### Gurudongmar lake and ecosystem services

The Gurudongmar wetland complex provides several type of intangible (amenity, recreation, aesthetic) ecosystem services to the region. The wetlands provide

regulating, provisioning, supporting, recreational as well as religious and cultural services to the region. (Photos 1 and 2). The functions, goods and services linked with the Gurudongmar lakes are in (Table 3).

 Table 3. Functions, goods and services linked with the Gurudongmar wetland complex

Functions	Ecosystem processes and components	Goods and services ( examples)
Water supply	Filtering, retention and storage of fresh water in the lakes	Provision of water for consumptive use
Aesthetic information	Attractive landscape features	Enjoyment of scenery (Frozen water of the sacred lakes, floating <i>ice</i> <i>needles</i> , hanging glaciers, <i>Khangchengyao</i> (6,889m), <i>Yulhe Khang</i> (6,405m), ( <i>Gurudongmar</i> (6,715m) and <i>Sanglaphu</i> (6,078m) mountain peaks, cols, arête, moronic ridges etc.
Recreation	Variety in natural landscape with (potential recreational uses)	Travel to natural ecosystem /sacred lakes for eco-tourism etc.
Cultural and artistic information	Variety in natural features with cultural and artistic value	Use of nature as motive in books, film, painting folklore, national symbol, architect, advertising etc.
Spiritual and historic information	Variety in natural features with spiritual and historic value	Use of nature/ sacred lakes for religious or historic purposes
Science and education	Variety in nature with scientific and educational value	Use of natural ecosystem/ sacred lakes for college/school excursions etc. Use of sacred lakes for scientific research etc.

Cf. Costanza et al. (1997); De Groot (1992) De Root et al. (2000)



**Photo.1.** Nature of human *vs.* nature interaction at the Gurudongmar lake



**Photo. 2.** Prayer flags quivering at the Shore of Gurudongmar lake signifying its sanctity.

Photos: Dilli Ram Dahal



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#### Threats to the lakes

The major threat to the lakes is unregulated tourism, decaying névéfield extending through Khangchengyao (6,889m), Yulhe Khang (6,405m), Gurudongmar (6,715m) and Sanglaphu (6,078m) mountain peaks under the stress of contemporary climate change, as well as offering items used by the pilgrims into the lake. Additionally, fragile geology of the region and its susceptibility to Glacial Lake Outburst Floods (GLOF) make them more vulnerable. The lakes have already been reported susceptible to GLOF by Mool et al. in 2001. Mool et al. (2001) have identified and mapped as well as reported 14 potentially dangerous GLOF lakes in the Sikkim Himalayan region which also include Gurudongmar lakes. Realizing the significance of the sacred lakes, pro-lake initiatives have already been carried out by WWF, India along with the local partner's viz., Lachen Dzumsa and Lachen Tourism Development Committee (LTDE). The pro-lake initiatives of WWF India are:

- 1. Cleanliness campaigns around the lakes.
- 2. Transportation of accumulated garbage for proper disposal.
- 3. Awareness generation among the tourists about the sacredness of the region through sign boards and quivering prayer flags at the shore of a lake.
- 4. Sensitization of the army personnels.
- 5. Ban on use of mineral water bottles in the Lachen village and in an around nature based eco-tourism destinations in the Lachen sector.

Thus, present study suggests regular monitoring of the lake through satellite remote sensing and GIS including depth estimation, discharge measurement, resistivity survey of the moraines damming the lakes as well as installation of GLOF sensor in the immediate vicinity of the lake region to generate long term data to understand the behavior of the glaciers and lakes in the higher Himalayan region as well as to warn the up-stream,mid-streamanddown-streamcommunities and to save the infrastructures created through central and state sponsored projects lying along the bank of Tista in Sikkim and Darjeeling region of West Bengal in case of lake burst owing to cloud burst, snow avalanche, excessive glacier-ice *calving* into the lakes.

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# **BIRD BIOACOUSTICS RESEARCH IN SIKKIM: RELEVANCE AND NEED**

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#### **INTRODUCTION**

Have we ever thought about the musical sound of birds or how this sense develops in them and when? Bird songisone of the most remarkable sounds in the natural world and has inspired not only students of natural history, but also great writers, poets and composers.

Of 1300 bird species in the Indian subcontinent, about 80% of them are found in the Himalayas (Grimmet, 1998). It is a matter of great pride that our state of Sikkim has more than 44% avian species found in the entire subcontinent. Review of literature reveals that most of theornithologicalworkindifferent parts of the state has been conducted mainly on taxonomy and distribution, habitat, species diversity and ethno-ornithology (Ali, 1962, Ganguli-Lachungpa, 1990a, b, c; 1992, 1994; 1998a, b, c; Ganguli- Lachungpa and Lucksom, 1998; Chettri et al. 2001, 2005; Acharya, 2008; Acharya et al., 2010; Jha and Jha, 2012). Besides, there has been few casual observations and listing of species (Islam & Rahmani 2004). There is hardly any report indicating sound-signal records of some of the avian species from Sikkim state. Also so far, no attempt has been made on biodiversity assessment by acoustics in the state of Sikkim. Therefore, the present article introduces the concepts of science of bioacoustics in general and

bird bioacoustics in particular and also establishes its relevance and need in the state of Sikkim.

#### THE SCIENCE OF BIRD BIOACOUSTICS

Bioacoustics is the study of animal sound communication. Birds use a variety of acoustics signals in their communication. These signals may be long and complex or short and simple and they may occur in particular contexts (Catchpole and Slater, 1995). On the basis of physical characteristics and functional contexts, these signals can be classified into songs and calls. The science of bioacoustics was born in the 60's, structured in the 70's and represents today an extremely diversified and multidisciplinary field of research, maintaining however a strong unity: its goal is to understand animal sound communication. In the case of birds, vocalizations can be divided into songs and calls and they use sound signals to attract and repel their mates and competitors. Surprisingly, bird songs follow a rhythmic pattern and pitches that are in tune almost with the human music. Musical sense in birds developsduetoformationofnewneuronsduringevery breedingseason.Inhumanbeings,oncetheneuronsget damaged they are quite impossible to repair, as a result of which the person remains unconscious for days or even years. But it is not so in the case of birds.



### Some of the song birds of Sikkim



Blue Whistling-Thrush (Myiophonus caeruleus)



Oriental Magpie-Robin (*Copsychus saularis*) Photo courtesy: Amar Singh



Red-tailed Minla (Minla ignotincta)



Red-billed Leiothrix (Leiothrix lutea)



Rufous Sibia (Heterophasia capistrata)



Silver-eared Leiothrix (Leiothrix argentauris)

All pictures (except 2<sup>nd</sup>) by Santosh Sharma PANDA | VOL. 7 | ISSUE 4 | 2014-15



In most avian species songs are only produced by the male sex and song production is under the control of male sex hormone testosterone. However, in several species, females also sing and some pairs even sing elaborate duets during certain times of the year. Only in song birds it is possible to form new neurons in High Vocal Centre (HVC) area of brain during every breeding season to express song.

The field of bird bioacoustics is an emerging area in Indiaandtherearefewinstitutesinourcountryworking on bioacoustics on limited number of avian species. Sofar, noone from Sikkim has under taken any extensive research in this field of ornithology except recording of timing of bird calls of Spotted Dove (Streptopelia chinensis), Red Junglefowl (Gallus gallus) and Blue Whistling Thrush (Myiophonus caeruleus) more than a decade ago (Jha and Jha, 2003). We have common singing birds around us such as Blue Whistling Thrush and Oriental Magpie Robin (*Copsychus saularis*), Asian Koel (Eudynamys scolopacea), Red-billed Leiothrix (Leiothrix lutea), Silver-eared Leiothrix (Leiothrix argentauris), Rufous Sibia (Heterophasia capistrata) and Red-tailed Minla (Minla ignotincta) etc. And thus, we have great opportunity to work on the science of bioacoustics and its application on biodiversity assessment. Hence, the field of bird bioacoustics is wide open research career to the up coming or nithologists of Sikkim.

#### **RELEVANCE AND NEED IN SIKKIM**

Our state lies in the Eastern Himalaya which is one of the four biodiversity hotspots of India among a total of 35 biodiversity hotspots in the world (Moghe, 2011). Sikkim has seen dramatic increase in urbanization and modernization especially in the last two decades. Consequently, although no research has been conducted yet it can be presumed that due to noise pollution especially around the urban towns like Gangtok, Namchi etc., the singing birds might be losing their power of communication to attract their mates as has been reported in some Europeans countries. The female bird is unable to hear the song of the male counterpart, which is affecting the reproductive process of these birds. In this regard, a study conducted in European robins in England has found that these birds picked up the habit of singing at night when there is little noise. The famous songbird Great tits (*Parus major*) produced songs with higher frequencies than by those in the less noisy parts of the city in Europe. We have Green backed tit (*Parus monticolos*) in the urbanized habitat (Gangtok, Singtam and Rangpo) of Sikkim.

#### CONCLUSION

Measuring biodiversity is a challenging task for research in the area of taxonomy, ecology and conservation biology. In spite of rapid and large scale landscape changes in the wake of modernization, we do not have any population trend information of even common breeding birds of Sikkim. These days most of the avian biodiversity assessment work is based on sightings. Therefore, the use of avian bioacoustics may be introduced for proper biodiversity measurement. Hence, in devising future biodiversity conservation strategies of the state, it is recommended that the avian vocalization should also be taken into consideration.

Therefore, there is a constant and pressing need to prepare sound archive of the birds and also monitor their population in order to develop management strategies and action plans for their conservation. We urge all the stakeholders of biodiversity in general and ornithologists in particulars to maximize their efforts for acquiring required expertise to preserve and conserve our rich natural heritage vis-à-vis our avifauna of Sikkim. There is also need of training more ornithologists of the state of Sikkim to tackle the avian and other biodiversity conservation issues, more particularly in the present day fast changing life style and developmental scenarios. Mere enthusiasm for nature conservation cannot ensure biodiversity conservation.

So far as the avian biodiversity research is concerned, the avian bioacoustics and biodiversity laboratory of Prof. Dinesh Bhatt, Gurukula Kangri University, Haridwar, Uttarakhand is leading in this field of research. Seeing his significant contribution to his area he has been nominated as an executive member in the International Bioacoustics Council (IBAC), U.K.



# Important Bird and Biodiversity Areas of Sikkim

Including three proposed Ramsar Sites:

**Priority Areas for Conservation** 

> Himalayan Monal (Lophophorus impejanus) Picture by: Dibyendu Ash

Usha Lachungpa Principal Research Officer (Wildlife) -cum- Addl. Director (SBB)

The state of Sikkim with its unique position in the mighty Himalayas and status as a hotspot of the variety of life is like a beautiful emerald in India's crowning glory. Our local population, their cultures and traditions have long protected this variety and made us popular world-wide. So far the most authoritative book on the bird diversity of Sikkim is 'The Birds of Sikkim' by India's pioneer ornithologist Dr. Salim Ali of BNHS. In this book he states eloquently and vividly '....This abrupt telescoping of the terrain – from the hot steamy foothill valleys to the arctic cold of the snow capped peaks – which has produced the marked altitudinal zonation in the rainfall, humidity, climate and vegetation is also responsible for the great

variety and numerical abundance of the resident bird life, making Sikkim perhaps the richest area of its size anywhere in the world....' having over 30% of the birds of the entire subcontinent comprising India, Pakistan, Nepal, Bhutan, Myanmar, Bangladesh and Sri Lanka. This comprehensive book though out of print now was the copyright of the Sikkim Forest Department in 1962.

Dr. Ali was commissioned by the then Durbar to do the study in which he involved some renowned bird enthusiasts and stalwarts. In addition to his personal field work, he also referred some of the best bird collections and references from this region. Not much has been done since his pioneering work.



Since last three decades, the Sikkim Forest Department has been compiling information on the various migratory birds, especially waterfowl over-flying Sikkim and using the various high altitude wetlands as stop-over sites. We have been able to add many more species to Dr. Ali's list of about 550 birds. We have many important birds in Sikkim. Information gathered over these years through the research wing of the department was incorporated in the national book 'Important Bird Areas in India: Priority Sites for Conservation' published by BNHS.

The globally threatened Black-necked Crane *Grus nigricollis* was recorded in Lhonak Valley and on the cold desert of the Tso Lhamo Plateau in North Sikkim as well as photographed by Roger Ahlman at Khecheopalri Lake in West Sikkim. We recorded breeding of Ruddy Shelduck *Tadorna ferruginea* in almost all the high altitude wetlands in North and East Sikkim. Migrating Avocets Avocetta recurvirostra were seen at Tso Chika at base of South Lhonak Glacier, and recently rescued from Tsungthang in North Sikkim; Mongolian or Lesser



Rufous-vented Tit (*Periparus rubidiventris*) Picture by: Usha Lachungpa

Sand Plovers *Charadrius mongolus* were recorded breeding at Bam Tso La on the extreme northern border of Sikkim. Critically endangered Baer's Pochard *Aythya baeri* was consistently recorded from Khecheopalri Lake. The birders' much sought after species the Ibisbill *Ibidorhyncha struthersii* was recorded from Lachung Valley in North Sikkim as well as the Rangit Valley in South Sikkim. Endemic bird area species like Rustybellied Shortwing *Brachypteryx hyperythra* and Hoarythroated Barwing *Actinodura nipalensis* are not difficult to sight in our forests.

Appreciating the importance of the State for globally threatened and other important birds found in this region of the Eastern Himalayas, the Government of Sikkim recognized eleven Important Bird Areas or IBAs across the entire state way back in November 2003. We were able to announce the same to the Bombay Natural History Society on the occasion of Dr. Salim Ali's birthday and the Centenary Journal Seminar on 12<sup>th</sup> November 2003.



Verditer Flycatcher (*Eumyias thalassinus*) Picture by: Usha Lachungpa





It was all thanks to the persistence of Dr. Asad Rahmani, the Director of BNHS that the Sikkim chapter of the national IBA book saw the light of day. After spending almost two decades sporadically roaming what my friends know as 'your Sikkim wonderland', it was not difficult to segregate Sikkim into eleven important bird areas or IBAs based on their unique features, natural flyways and altitudinal niches or eco-regions. It also

Sikkim has the proud privilege to be the first Indian state to have officially banned the non-steroidal anti-inflammatory drug Diclofenac used by veterinarians and causing the almost complete annihilation of our vultures. Government notification No. 04/AHLF&VS dated 22.12.2005 declares a complete ban on use of drug Diclofenac Sodium with immediate effect throughout the State of Sikkim. At present Sikkim has the best wildlife protected area coverage in the country. Our only national park is the highest in India, with Mt. Khangchendzonga the guardian deity of Sikkim at 8598m, also being the third highest mountain peak in the world. We have seven wildlife sanctuaries including Kitam Bird Sanctuary as well Slingdong Tinkitam Conservation Reserve for conserving the threatened orchid Paphiopedilum farrieanum in lowland South Sikkim.

Our *ex-situ* conservation area, the Himalayan Zoological Park is another important birding destination in the state capital Gangtok. We are also designing a Walk-in Aviary at Rabdentse Forest in West Sikkim along international lines in keeping with our claim to fame as an ecotourism destination. The Sikkim Ornithological Society launched in Gangtok our capital on Dr. Salim Ali's birthday in 2004 is a local NGO which has already established two bird clubs at Pelling and Yambong Valley in West Sikkim aimed at initiating local youth into new employment ventures as nature guides and bird guides.

helped that most of the state is under the wildlife protected area network. Thanks to Dr. Rahmani, some of the best photographers of Indian birds freely lent their pictures for our Sikkim book. Mr. Zafar and later Mr. Abhijit Malekar patiently and efficiently responded to every query. Late Mr. C. Lachungpa IFS CF and DFOs of the department's Wildlife Circle helped source funding for the book.



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Some of the material in the book is updated. It is also more user-friendly sized and a lot more pictorial thanks to the various dedicated photographers like Otto Pfister, Peter Lobo, Dipankar Ghosh, Sumit Sen, Ganden Lachungpa, Pranav Chanchani, Sandeep Tambe and many enthusiasts. Carl D'Silva, perhaps India's best bird artist gifted two of his illustrations for the book. Thanks to the efforts of Lukendra Rasaily and Karma Takapa of the NGOs Sikkim Ornithological Society (SOS) and Sikkim Development Foundation and with help from Rajendra Suwal and Sherab Wangdi, we could also add six plates with 74 common birds beautifully illustrated by Hira Lal and Sharada Dangol and with local names in Nepali.



Fire-tailed Myzornis (*Myzornis pyrrhoura*) *Picture by*: Dibyendu Ash

The Sikkim IBA book was officially released by the Hon'ble Chief Minister of Sikkim Shri. Pawan Chamling and the then Hon'ble Minister Forests Mr. S. B. Subedi on the occasion of World Environment Day on 5<sup>th</sup> June 2007 at the Saramsa Garden in East Sikkim.

### **Three Potential Ramsar Sites**

Subsequently following again on the initiative of Dr. Rahmani's book "Potential and Existing Ramsar Sites in India" in collaboration with Wetlands International, BirdLife International and RSPB-UK, the following three **Potential Ramsar Sites** were proposed from Sikkim, for which detailed information sheets (RIS: 2009-2012 version) have already been compiled and submitted to Ministry of Environment and Forests in 2011:

Name of Proposed Site		Comprises of	Brief Description
1.	Khecheopalri- Khangchendzonga- Lhonak Complex	<ul> <li>Khecheopalri Lake and two IBAs namely</li> <li>i. Khangchendzonga biosphere Reserve (KBR) (West and North Sikkim)</li> <li>ii. Lhonak Valley (North Sikkim)</li> </ul>	A wetland complex of India's highest altitude National Park and Biosphere Reserve, with Khecheopalri on the southern fringe, Lhonak Valley on its northern fringe and the Tista River Valley along its right flank
2.	Tsomgo-Bedang Tso Complex:	<ul> <li>a. Kyongnosla Alpine Sanctuary– Tsomgo- Tamze-Chola Complex (IBA)</li> <li>b. Pangolakha Wildlife Sanctuary– Zuluk-Bedang Tso Complex (IBA)</li> </ul>	The only wetland-forest complex with its main water body in Sikkim draining out of the state into Bhutan instead of through it
3.	Tso Lhamo Plateau-Lashar- Yumesamdong- Tembao Complex	<ul><li>a. Tso Lhamo-Lashar-Sebu La- Yumesamdong Complex (IBA)</li><li>b. Tembao Lake and Glacier Complex</li></ul>	The largest wetland complex forming the sources of the principal river of Sikkim, the Tista, originating in the cold desert and trans-Himalayas in the north.

We hope that with these Avian initiatives from Sikkim, more and more people get involved in the enjoyment, study and conservation of the rich bird and biodiversity of our small but beautiful state's land and wetlands.

Acknowledgements: Dr. Asad R. Rahmani, Director BNHS, Late Mr. Chezung Lachungpa, Ms. Nisha Subba SFS ACF, Ms. Yangchen Bhutia SFS ACF



# **Brief fact about Saramsa Garden**

S K Thatal, Joint Director (Parks and Garden)

aramsa Garden was established by the Sikkim Forest Department in 1922 initially to grow fruits for the erstwhile Kingdoms Palace and British Political Officer. The then Forest manager Rai Saheb Bhim Bahadur Pradhan is credited for developing the garden into a main centre for introduction of fruits like pineapple, guava, banana, oranges and lychee. Some of the lychee trees are still fruiting in the garden.

The practice of growing fruits continued till 1940 after which the Forest Department introduced *Cephaelis ipecacuanha*, a medicinal plant from Johore, Malaysia. The plant was used in the production of emetine and cephaeline, a powerful alkaloid of great pharmaceutical interest. Though the cultivation of Ipecac was discontinued in 1970 due to the non-availability of raw materials, the garden is still popularly known as Ipecac Garden.

In 1975, the garden was converted into an Orchidarium for growing different types of Orchids. The majority of plants flourishing in the garden presently were introduced during 1975-80. In 2008, the garden hosted the first International Conference on

Rhododendron, an event promoted by Government of Sikkim to promote the region as a centre of floriculture.

Presently the garden harbours more than 20-25 tree species, 30 varieties of shrubs and bushes and more than 60 flowering and non flowering species. Spread over an area of about 15 acres, the garden has a good blend of greenery and open spaces. The exhibition stalls spreading at the periphery infusing the concept of ethnicity sync with the landscape are made with the bamboo posts and wooden flooring.

Saramsa Garden is an asset managed by the Parks and Garden Circle of Forest, Environment & Wildlife Management which not only provide the open space for the picnickers and toddlers to enjoy the natural bounty but also an ideal ambience for hosting events. This garden has the potential of being one of the best gardens not only in Sikkim but also amongst the neighbouring States, if managed properly.

Contributed by: Purna Subba, Range Officer (Saramsa Garden)



# **State Level Nodal Agency Sikkim**

State Level Nodal Agency (SLNA) Sikkim has been constituted under the Department of Forest, Environment & Wildlife Management, Government of Sikkim to implement the Integrated Watershed Management Programme (IWMP) of Department of Land Resources, Government of India. The main objectives of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The outcomes are prevention of soil run-off, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area.

Eleven (11) projects are being implemented in all four districts of the State covering an area of 64188 hectare.



Distribution of PIGLETS under Micro Enterprises of IWMP - II East



Distribution of Vanaraja Chicks under Micro Enterprises of IWMP- I North

Further four new projects have also been sanctioned during the financial year 2014-15.

For More Details login to www.slnasikkim.org



/egetative barrier in IWMP – II East



Training on Vermi Compost at IWMP I North



Soil Moisture Conservation at IWMP- I North



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# My-Eco-Story EARTH DAY SPECIAL LIVING THROUGH VALUES

Hi, I am a Graduate Teacher (Arts) from Middle Camp Secondary School, 32 mile. About five months back, I came across a wonderful project in the website www.earthdaybags.org which not just caught my attention but made me feel that I should do it come what may. Well this particular project was started by some school in Washington DC and today it is being done in more than 192 countries. India has participated too, but we are probably the first one in the Northeast India to do it. Among some given project *ideas, one project involves approaching some grocery* store or any happening eatery who uses paper bags and getting it painted by students and giving it out to people on 22nd April, so that awareness is created among the masses in a different and interesting way. The first person I spoke to about this event was Thinlay Choden Bhutia, co-editor of the magazine "Good Books" as she always supported me genuinely.

Hence, after the school reopened for 2015 session, I expressed my desire to my Head Mistress Mrs Sunita Upreti who was very happy and gave me the green signal. Then I wrote to Mark Ahlness, the person connected with this project, based in Seattle, USA. He wrote back saying that he would love to see more of my project and so I went for it.

It all started with sharing my idea with my close friends Peden Chingapa, Deeki Zangmu and Ongmu Lepcha who promised me their support. Then I proceeded further by approaching Coffee Shop for their 50 cloth bags and got it painted for free with pictures and messages by my school kids and returned it back to them for distribution on the main day to their customers.













Along with this, I got 300 bookmarks made with messages written by students and my team. We then got four class 10 students namely Prashanta Chettri, Sarina Rai, Bijay Chettri and Bishal Rai practice some songs like "Imagine" by the famous legend John Lenon, one self composed song on the theme " save water" etc among many others.

And on 21st April my team went to Biraspati Parsai Vidyamandir Govt School, Ranipool and spoke to class XII students on the importance of Earth Day. My students sang songs so as to make it interesting while we distributed some bookmarksl. Overall, it was a small event but worth the visit.

And on 22nd April, we went to MG Marg, held our signature campaign where by people came and pledged to make a small difference in their own little ways to save and conserve energy and resources, there along with distribution of free bookmarks to those who took time to come and sign the pledge cards while our students enthralled the crowd with their songs. Coffee Shop did their bit by giving out those bags to customers who bought goodies that day. We were overwhelmed with the turnout, as many passers-by including local media participated and gave good coverage of our small initiative.

To conclude, the day was very tiring but fun. It was an experience of a lifetime and something that I am going to treasure for a lifetime. My dream project had finally been delivered. I owe my sincere Thanks to our HM ma'am who has always supported my ideas, my gang of girls....my team who believed in me and this project, my students who helped me in living this dream, Thinlay Choden Bhutia who stood by me and motivated and supported me all through and of course the main people who started this sort of project which was not just fun and challenging but worth it all. Next year we plan to challenge ourselves more by going in for more number of bags and adding more events.











#### **Confucius once said**

"Choose a job you love and you will never have to work a day in your life"

#### and I seemed to have found one!

May 25<sup>th</sup> 2011, the most memorable day for me and my parents, I got through the State Forest Service and it was the first day of joining the Forest Department, Sikkim. Honestly, I had never imagined myself (Physicist) being in the forestry sector. In fact, I did not even know the full form of ACF until I got into it! L... Actually like most laymen I had only heard about RO's and DFO's.

We were a batch of 19 freshly recruited ACFs'(15 ladies and 4 gents) given postings in various capacities. I was posted to the Wildlife Division, North. After 6 months in the department we all got the confirmation for our 2 years forestry training course in **CASFoS** (Central Academy for State Forest Service), Coimbatore.

So, all my bags were packed and I was ready to leave for Coimbatore on  $3^{rd}$  of January, 2012 as we had to report to the Academy on  $4^{th}$  Jan, 2012.

So, finally reached CASFoS, Coimbatore on 3<sup>rd</sup> January at around 7:30 pm and we were allotted single rooms in Chandan hostel. The next day, we all were asked to assemble in the Corbett hall around 10:00 am. There along with 19 of us from Sikkim we met trainees from other states like Jammu & Kashmir and Meghalaya and we were tagged as "SFS Trainees (2012-14) Batch". Our journey started henceforth... ©



Right from morning 6:00 am PT to evening 6:00pm games. Initial days were really very tough, painful and hectic for all of us as none of us were used to such workouts and tight schedule. And most important the uniform finding ourselves in 'grey' and 'white' salwar suit with pair of 'Naughty Boy' shoes was itself no less than a challenge. It was like our school days back again!J... So, we all had to mentally prepare ourselves for the further journey of 2 years as it was just the beginning!

Rigorous morning PT used to leave us totally exhausted and to add on the hectic classes, but gradually my mind and body got accustomed to the daily routine, rightly as the saying goes "whengoinggetstough,thetoughgetsgoing".... this is what I personally experienced after going to CASFoS. And many more experiences were yet to be unfold.....©

Then came with a bang, the Special Task Force (STF) Tamil Nadu, Jungle survival and Combat training for 10 days. Never ever in my life I had stayed in a jungle and the very thought gave me a mixed feeling of excitement and fear for the unseen. We reached a place called Sathyamangalam where we were asked to wear the oversized camouflage outfit which was not so pleasing but had to L... We headed towards anotherplacecalledMangalpatty,totallyunaware of what's in store for us on the other side. None of us would have ever imagined or even dreamt of such phase in our lives, sleeping in tents, sentry duty, activities like rock climbing, rappelling, river crossing by winch, slithering by rope, artificial wall climbing and so much so handling of AK-47, SLR, Glock-17 and firing at the firing range which was really exciting, thrilling and a life time experience!...We as trainee batch had to perform all the activities with no relaxation for anyone. All were treated at par and surprisingly in some tasks we girls performed better than the boys! (Girl Power ! J). The STF training indeed drilled and conditioned us inside out. I could knowmyweaknessesandstrengthsandithelped in building my self confidence.









Then tours, a major part of our training where we got this wonderful opportunity to travel almost throughout India and especially the trip to Andamans was really amazing for all of us. During the tours we were exposed to many different aspects of forestry and management issues, interaction with the forest officials of various states enlightening us with their knowledge and field experiences which I think is beyond the scope of any forestry book. But the story doesn't end here, every tour was followed with symposium, journals, herbarium and tour exam and in between the scheduledsemesterswhichindeed taught me the meaning of time management.

Since my schooling days, I was always aloof from the extra cocurricularactivities,butsomewhere deep down had a keen interest to develop that side of me. But in CASFoS, I got the opportunity to learn all type of games and could bring out that side of me. I even participated in the CASFoS sports meet and bagged some medals, which was really a great feeling for me.NevereverthoughtthatIcould experience all these even after my college life, which I always



used to think I MISSsseD!!©

We had to study twenty different subjects under the umbrella of forestry, right from 'Botany' to preparation of 'Working Plan' which was a total plunge atleast for me (Physicist) from study of 'Force and Reaction' to 'Coupe and Felling series'...© As everything has to come to an



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END! ... so finally it arrived the "Convocation Day" for SFS Batch (2012-14). Could not believe that 2 years had passed by and our sojourn at CASFoS, Coimbatore had come to its end. We all had so much waited for this day but when it finally indeed arrived some of us werefeelingsaddeepdownanddid not want to bid adieu to CASFoS! So, we all boarded our flight and got set for our new journey with full zeal and enthusiasm. Never ever thought that getting into this profession would unfold such opportunities for me that, I could rediscover myself, could experience all what I always used to think I MISSssseD!! Anyways, as the saying goes "Better late than never".

It's been a year after coming from CASFoS and when I look back and recollect my experiences of those 2 years, I find those were the best



pages of my yearbook. Never any year of my life had been so fruitful, worthy, promising, and simply wonderful! Confucius once said "Choose a job you love and you will never have to work a day in your life"andIseemedtohavefoundone! For being part of such beautiful mosaic of experiences, I feel genuinely bound to extend my heartfelt thanks to our State Government, Forests, Environment & Wildlife Management Department for giving us such a wonderful opportunity to get trained at CASFoS, Coimbatore and above all the Almighty, my parents and my sisters for everything in my life! And I look forward to use my knowledge and skills gained so far for the betterment of my state as well as hope for more such experiences where I can expand my knowledge base.



### Research Study cum Training on Wildlife-Borne Diseases and their Prevention in Fringe Areas of KNP/KBR in Sikkim

March 9-10, 2015

Report by:

Usha Lachungpa, Principal Research Officer (Wildlife) –cum-Addl. Director (SBB)

An in-house study of apparently sporadic cases of skin infections in some wild ungulates in Sikkim revealed interesting observations. Over the last decade (before and since 2000) there have been cases of zoonotic diseases such as FMD (Foot and Mouth Disease), Avian Influenza (Bird Flu), Canine and Feline Distemper, Rabies in Sikkim and even some Swine Flu cases recently. Some have been recorded from border areas of the state. Mite infestations causing scabies or mange are some of the most prevalent animal infections which are also of zoonotic importance. This has enormous implications with some diseases affecting endangered species like Goral, Serow and Himalayan Tahr or 'Shapi', Red Panda as also domestic livestock like Goats, Sheep, Pigs and even Yaks. Wild animals like Golden Jackal and Hill Fox are carriers of Rabies virus which is usually fatal to livestock and human beings.

These various infections can cause high mortalities in wildanddomesticanimals, highlightingthe importance of regular immunization of domestic animal populations in areaswhere there is frequent contact between the domestic and wild animals. This helps in disease prevention as well as heavy economic loss through deaths of livestock and heavy cost to conservation through deaths of wild animals.

Following preliminary discussions with officials of Department of Animal Husbandry, Livestock, Fisheries and Veterinary Services (AHLF&VS Dept.), where matter of Bird Flu and Swine Flu has received more attention, it was seen that reports by local people of un-natural wildlife mortality in Forest and Wildlife Protected Areas (WLPAs) needed to be addressed equally urgently through a serious effective long term control and prevention strategy. Most reports were of wild herbivores like Gorals, Serow and 'Shapi', with scabies-type skin diseases and carcasses found near waterways, harbouring potential for contamination. Besides, these animals are key prey species of threatened carnivores like Snow Leopard, Eurasian Lynx, Clouded Leopard, Common Leopard, Golden Cat, Tibetan Wolf, Wild Dog, Brown and Black Bear, as well as Jackals, Foxes, Martens and Weasels.



Field Sampling

Also domestic livestock and pet populations in villages fringing National Parks and Wildlife Sanctuaries are susceptible to many diseases which transmit from wild animals and vice versa. Khangchendzonga National Park and Biosphere Reserve (KNP/KBR) supports a number of rare and endangered mammals, birds and other wildlife. It also provides sustenance to large population of people and their livestock living in and around the Reserve.

#### **Pilot Strategy:**

Inordertosensitizethestakeholders, trainingprogrammes were organized in West, North and South Districts on "Wildlife Disease Surveillance in Sikkim" in collaboration with AHLF&VS Dept. The programme also aimed for capacity building of Himal Rakshaks, JFMC, EDC members and frontline staff of the Forest Dept. The programme was structured to give basic theoretical knowledge on the types of diseases in animals, their causes and ways to deal with on-ground situations and hands on experience on collection of samples of skin, blood and faeces correctly, preservation and dispatch to designated laboratories. Training was also imparted on handling techniques for wildlife in case of emergencies. Later 10 Wildlife Disease Surveillance Kits were distributed among the participants.



Sarcoptes mites on Goral Skin



**Trainings Conducted:** Topics covered included general introduction to zoonotic diseases, importance of history taking, collection of skin, blood and fecal sample techniques with hands-on practical demonstrations, handling techniques, wildlife rescues, do's and don'ts, importance of regular immunizations, vaccinations, etc.

- 1. YUKSAM, WEST SIKKIM: 6-7 December 2013: Chief Guest Ms. Rinzing Choden SDM Yuksam, West Sikkim. Participants: Himal Rakshaks and Frontline Foresters
- NAMPRIKDANG, NORTH SIKKIM: 11-12 February 2014: Chief Guest Mr. Nim Tshering Lepcha, Hon. Up-Adhyaksha. Participants: EDCS of Leek, Bey-Pentong, Saffo, Shipgyer, Tingbong; JFMCs of Lingdem/Laven, Hee Gyathang, Lingtem, Gor, Tarang and the NGO MLAS.
- 3. RAVANGLA, SOUTH SIKKIM: 9-10 March 2015: Chief Guest Mr. Tashi Chopel Additional District Collector, South. Participants: Panchayats and EDCs as well as Frontline Foresters. An awareness programme on Biodiversity and Wildlife Protected Area Management in Sikkim was also conducted on this occasion.

Based on these training programmes and resulting interactions, a more detailed work plan for formation of a Rapid Action Force for state-wide surveillance including immunization and vaccination plan is now under preparation.

#### Acknowledgements:

**Foresters:** Range Officers Mr. Ongden Lepcha Range Officer, Mr. Karma Lepcha, Mr. Keshab Bdr. Chettri, Ms Urmila Chettri, Mr. Chewang Tashi Bhutia and all their staff; ACFs Mr. Dinesh Kumar Rai, Ms. Shewani Pradhan SFS, Mr. Kamal Subba; Computer Assistant Mr. Robish Pradhan; DFOs Mr. Tshering Pintso SFS, Mr. Sangay Gyatso Bhutia SFS, Mr. Nischal Gautam SFS; Director KNP/KBR Mr. J. B. Subba IFS, CCF cum CWLW Mr. C. S. Rao IFS, Prin. Secretary cum PCCF Dr. Thomas Chandy IFS

Veterinarians: Dr. K. C. Bhutia AD, Dr. Karuna JD-Dl, Dr. Kalpana Pradhan Dy Dir, Dr. Mala JD, Dr. Sanjyog Rai (VO Tashiding), Dr. Minla Z. Lachungpa (Asst. Zoo Conservation Biologist), Dr. C.P. Rai, (Dy. Dir, Dzongu) and Dr. Dechen Kaleon (Dy. Dir, Mangan), Dr. Tshering Choden Bhutia (Dy. Dir (Ravangla), Dr. Kinchokla Bhutia (VO Namchi);

### Kananasangamam- Mega Expo

April 17-22, 2015 | Kerala



Sikkim delegates in traditional attire during the exhibition

SikkimStateactivelyparticipated in the Kananasangamom mega expo of people and forests showcasing the livelihood, art, craft, and culture of people held at the historic Kanakakkunnu Palace and its extensive premises in Thiruvananthapuram, Kerala from 17<sup>th</sup> April to 22<sup>nd</sup> April, 2015. Sikkim delegation of 9 stakeholders (JFMC/EDC), 5 office staffs and 5 forest officers joined the event also participated by states like Jharkahand, Chattisgarh, Telangana, Odisha, Tamil Nadu, Manipur, etc.

The inaugural function was graced by the Hon'ble Chief Minister of Kerala Shri. Oommen Chandy. Participants from different states contributed in the exhibition, procession, ethnic food fest, film show, vanarashee trade fair, forest honey meal, bamboo crafts meal, photo exhibition, workshops on "Forest Rights Act, 2006" and "Participatory Forest Management" and seminar on "Conservation for Livelihood" during this six days fest. Some of the best practices of Sikkim State giving focus to the paryavaran mahotsav, capacity building of various stakeholders were shared to the gathering by the Sikkim forest officials.

Sikkim participants having a colossal opportunity in Kerala, visited Thenmala Butterfly Park and Kerala Forest Research Institute (Butterfly garden) to study and understand the various repositories of the diverse butterflies and management for the creation of Butterfly Park at Rangrang, North Sikkim under JICA assisted SikkimBiodiversityConservationandForestManagement Project.





### Spread Effect Villages

Dechen Lachungpa, DFO (SBFP)



As a part of Honorable Chief Minister's "Forests and Environment Mission 2015", scientific management of forests aimed at sustainable use of forest resources and benefit sharing is being undertaken under the JICA assisted Sikkim Biodiversity Conservation and Forest ManagementProjectasapartofJointForestManagement with objective of improving the management of forests and conservation of biodiversity through the engagement of forest fringe communities. It is also aimed at providing opportunities for these communities to enhance their livelihood through forestry, ecotourism and other income generation activities. Apart from the selected JFMC & EDC, villages falling close to these villages are also taken up for participatory forest management. Such villages are termed as Spread Effect Villages.

Sikkim has a total of 219 JFMCs and EDCs. Out of these, under SBFP project 45 no's of Initial Intervention Villages was selected in year 2012 which was followed by selection of another 45 no's of Spread Effect village in the year 2013. Accordingly, the SBFP has selected another 2<sup>nd</sup> group of 45 Spread Effect Village for the year 2015-16. The selectionhasbeendonebasedon certain standard criteria. Now, in this newly selected group of Spread Effect Villages, micro planning activity will have to be undertaken with the help of Community Organizers. Once the micro planning exercise has beenconductedthenentrypoint activities and other activity will be undertaken in the selected villages.

## Rapid Biodiversity Survey Report Released



February 18, 2015 | Chintan Bhavan, Gangtok

The Honorable Chief Minister, Shri. Pawan Chamling during the 3<sup>rd</sup> board meeting of the Sikkim Biodiversity Board on the 18<sup>th</sup> February 2015 released the book titled "Rapid Biodiversity Survey Report". This book has been compiled under the JICA assisted Sikkim Biodiversity Conservation and Forest Management Project as a part of the Rapid Biodiversity Survey being undertaken throughout Sikkim. This is an initial compilation of survey undertaken in few locations and many such surveys will be taken up in the future. The survey is being done to create a baseline data and to create inventory of natural resources of select locations.

	List of Spread Effect Villages									
SN	North District	East District	South District	West District						
1	Zimchung Malling, JFMC	Parkha JFMC	Singithang JFMC	Okhrey-Ribdi Bhareng JFMC						
2	Mangan JFMC	Chuzachen JFMC	Damthang-Jaubari JFMC	Suldung Kamling JFMC						
3	Singik Singchit JFMC	Shyari JFMC	Tarku JFMC	Sangadorjee JFMC						
4	Pakshep Kazor JFMC	Rongli JFMC	Kateng-Bokrong JFMC	Barthang-Bermoik JFMC						
5	Ringkhim Namatam JFMC	Rateychu JFMC	Negi-Maneydara JFMC	Sakyong JFMC						
6	Gor Tareng JFMC	Namgeythang JFMC	Barfung-Jarong JFMC	Gyalshing -Omchu JFMC						
7	Lingtem JFMC	Samdong EDC	Ben-Namprik JFMC	Topung JFMC						
8	Phidang JFMC	Pangthang EDC	Rateypani JFMC	Tashiding JFMC						
9	Sakyong EDC	Sumik EDC	Sadam-Suntaley JFMC	Sreebadam EDC						
10	Lachen EDC	Rumtek EDC	Pathing EDC	Sombaria EDC						
11	Saffo EDC	Rakdong EDC	Compound-Majitar EDC	Chongri EDC						
12	-	-	-	Naku-Kongri EDC						

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## Training on Biodiversity Conservation and Forest Management at IIFM, Bhopal

January 12-23, 2015 | Bhopal, Madhya Pradesh



A twelve (12) days training programme on Biodiversity Conservation and Forest Management was participated by eleven (11) forest officers and staff of Sikkim Forest Department at Indian Institute of Forest Management (IIFM), Bhopal, Madhya Pradesh. The programme was arranged into first six days of lecture, presentation, in house training and next six days of field trips and visits to Sanchi heritage site, Bhopal gas tragedy site, State museum, tribal museum, Ujjian caves, upper lake etc.

# Refresher Course for Frontline Forest Staff

January 16-29, 2015



Two weeks general refresher course for frontline staff of State Forest Department was organized by the Working Plan Circle at forest conference hall, Gangtok. A batch of about 30 forest guards, block officers and range officers from various divisions throughout the State was imparted training cumrefresher course by resource persons from the Forest Department. The training is an ongoing process to empowerment the field level staff and officers with latest issues on forestry, wildlife, biodiversity, environment and its technological intervention for the upkeep of the State's natural resources.

# ENVIS Evaluation Workshop and Training on Bhuvan portal

March 23-24, 2015 | Guwahati, Assam



A two days evaluation-cum-training workshop for ENVIS Centres of Eastern and North-Eastern Region (i.e., Nagaland, Manipur, Mizoram, Sikkim, Tripura, Assam, Bihar, Jharkhand and West Bengal) was held at NEDFi Convention Centre Guwahati, Assam hosted by ENVIS Centre at Assam Science Technology and Environment, Council (ASTEC) during 23rd and 24th March, 2015. About 30 participants from 13 ENVIS Centres comprising both thematic and State/UT Centres attended the Workshop. This two days event was chaired by Shri M. Kannan, Economic Adviser, MoEF&CC along with Shri. Rajnish Kumar, National Programme Coordinator.

This workshop was organized to evaluate the functioning of the ENVIS Centres as per the Guidelines of the ENVIS Scheme, framed by the Ministry of Environment, Forest & Climate Change, Government of India. The evaluation of each centres was conducted by four eminent experts from diverse fields selected by the ministry from across the country.

Each centre was allotted 40 minutes to present the 2014-15 activities through online CMS based portal. Sikkim ENVIS at Forest Environment & Wildlife Management Department, Government of Sikkim was represented by Shri Rajen Pradhan, Sr Programme Officer and Ms Renu Gurung, IT Assistant. Sikkim ENVIS also tagged as GURU Centre was asked to continue its technical support to other centres especially the north-eastern region centres. It is to mention that Sikkim ENVIS had secured the highest marks of 85 out of 100 during the 2013-14 evaluation workshop.

In addition to evaluation, an orientation-cum-training programme on Bhuvan Portal (a geo-spatial platform of National Remote Sensing Centre of ISRO) was also conducted by the scientist of NRSC, ISRO, Hyderabad.



# CMS VATAVARAN Film Festival and Forum

March 12-17, 2015 | Gangtok, Sikkim



Centre for Media Studies (CMS), New Delhi in collaboration with ENVIS - Forest Department, Science & Technology Department, Nehru Yuva Kendra and other local bodies organized environment and wildlife film festival and forum on March 12 – 17, 2015 at Gangtok, East Sikkim as a part of 6<sup>th</sup> travelling edition of CMS Vataravaran.

The festival was inaugurated by the Hon'ble Forests Minister ShriTshering Wangdi Lepcha at Chintan Bhawan on March 12. During the inaugural function, CMS New Delhi felicitated two environmental activists from Sikkim Mr. Nosang Limboo and Ms. Tshering Uden Bhutia as State Green Ambassadors with citations and trophies.



Twenty- seven year old Nosang Limboo, who hails from Darap, West Sikkim has panned book on the butterflies and moths of Sikkim and has been extensively carrying out butterfly conservation in Sikkim while Tshering Uden Bhutia 42, is the founder member of Khangchendzonga Conservation Committee (KCC), Yuksam, West Sikkim and has dedicated her life towards waste management, watershed management and management of KNP.

During a weeklong festival, various events such as screening of about 20 international award winning documentaries, nature trail, biodiversity quiz, green film making workshop and panel discussion on biodiversity conservation in Sikkim was held. The festival was participated by students, teachers, youths, government officers, NGOs and local bodies.



### Tinjurey Ecotourism Festival 2015

March 28-29, 2015 | Pangthang, East Sikkim *Report by* N. Jaswant, IFS, DFO (Ecotourism)

Forest, Environment and Wildlife Management Department, Government of Sikkim is implementing the SikkimBiodiversityConservationandForestManagement Project (SBFP) assisted by JICA since 2010-11. The majorcomponents under the project include:Biodiversity Conservation, Ecotourism and Joint Forest Management. The Directorate of Ecotourism under the project aims at the development and promotion of Ecotourism in the State for which 11 zones have been identified. Nampong-Lingdok is the first zone among the 11 zones where the final product, package designing and development has been completed and is ready to be opened for marketing.

The Tinjurey Ecotourism Festival held on 28<sup>th</sup> and 29<sup>th</sup> March 2015, was the first-of-its-kind festival in Sikkim, intended to introduce the Nampong-Lingdok Zone as an ecotourism destination to the local, National and International Tourism Market.

The two day festival was inaugurated by Hon'ble Minister of Forests, Environment and Wildlife Shri Tshering Wangdi Lepcha and attended by PCCF-cum-PS & Project Director, FEWMD and distinguished guests from Forest as well as other line Departments.







## **Festival Activities**

- 1. NATURE BASED ACTIVITIES: The festival included the following nature based activities which were confined to the sanctuary area.
- **Bird watching:** a short bird watching trail was opened to the guests where the bird enthusiasts could see different varieties of birds found in the Fambong Lho Wildlife sanctuary.
- Gurasey Trail (Rhododendron trail): a 3 kms short, self guided hiking trail was also opened to the guests where tourists could see the flowering Rhododendron.
- **Traditional healer:** a stall was also put up at Golitar campsitewithatraditionalhealerdemonstratingtheuses of local medicinal plants to the visitors.
- Awareness: Environment educational activities on zero waste by local NGO's.
- 2. CULTURE & VILLAGE BASED ACTIVITIES: The culture and villages based activities took place at Gairi Goan and Rail Gaon, the two closest villages to the sanctuary where the following activities such as milching cow, visit to cardamom field, local games like, archery and dart, traditional food stalls, museum, cultural dances were enjoyed by the visitors.

### Unique Features of the Festival

- 1. Waste Management: To quantify the amount of waste generated during the two days festival, a total of 20 bamboo dustbins (locally known as *Doko*) were strategically placed inside the sanctuary and in the villages. A total of 47.5 kg (22.5 kg and 22kg on first and second day respectively) waste was genreated. The approximate number of visitors including students, invitees and the stakeholders who were there in the festival and generated the waste is 807 (40 stakeholders+502tourits+100guests+135students+30 volunteers and staffs). Accordingly the waste generated per head was 59 grams which is very less.
- 2. Revenue Sharing: A total 502 tourists were recorded. The ticket rate of Rs 50/- for local and national tourists and Rs 100/- for international tourists generate revenue of Rs. 25,700/- from which 40% (Rs. 10,280/-) was deposited in to concerned government revenue and 60% (Rs. 15,420/-) went to Pangthang EDC village developmentfundasapartofbenefitsharing.Apartfrom this, approximately Rs.2,34,000/- was earned directly by the EDC members through the various food/crafts stalls. The local shuttle cars used for the transportation of tourists from one activity area to another also generated additional Rs 82,000/-.
- 3. Environmental Education: As part of the departments' initiative of promoting environmental awareness, local

youths and students were involved in the festival. Many educational activities were specially designed by the NGOstoprovideenvironmentaleducationtothevisiting students.

### Achievements of the Tinjurey Ecotourism Festival:

The festival was successful in achieving the following goals:

- Creatingwiderawarenessabouttheecotourisminitiative in Nampong-Lingdok among local stakeholders, government departments, officials, members of the community, panchayats, etc.
- Providing an opportunity to local people to showcase their talents, crafts and way of life
- Facilitating in bringing together all relevant stakeholders onto a single platform
- Generate awareness about conservation among school children
- Publicizing the ecotourism products/packages available in the zone to the tourism market
- Instilling confidence among the stakeholders for carry out sustainable ecotourism
- Paving the way for similar events in the other 10 Ecotourism Zones





# SHAPI - HIMALAYAN TAHR in Phimphu KNP North Sikkim

S. T. Lachungpa, ACF (KNP), Chungthang, North Sikkim



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#### 04 MAR 2015 12:17 pm

Usually Thar population in Phimphu valley varies from 15 to 17 every year. But surprisingly this year on 28th March, 2015 team headed by me for head count survey as well as on combing operation recorded sixty numbers of Shapi from four different sites in Phimphu valley.

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himphu Valley having an altitude of 7180 ft is located in core zone of Khangchendzonga National Park (KNP) under the jurisdiction of Chungthang Range, KNP North division and is one of themostimportantwinterhabitationalzonesofSHAPI-Himalayan Tahr. Located towards North-West of Chungthangtown, Phimphucanbereached by vehicleup to road head at Dharey, which is 5 km from Chungthang and has about 8 km trekking distance from roadside. During peak winter months the Shapi-Himalayan Tahr takes shelter in wooded forest along German-Orar-Phimphu halt ridge and flanks for feeding as well as resting and sheltering against severe winter months.



The forest cover of Phimphuis temperate broad-leaved forest and mainly dominated by *Champ, Okhar, Tarsing, Bhadrasey, Kaula, Mahuwa, Kharani, Cinnamomum, Pipli, Buk, Katus, Phalat, Kimbu, Timbur, Pareng, Amliso, Chimal* etc and host other medicinal herbs and shrubs.

In Phimphu, there is one three room log hut and a separate kitchen hut constructed with the grant under the scheme MAP of KBR (100% CSS) during 2008-09, which is to facilitate the lodging of field official and staffs during usual patrolling, field combing operation, head countsurvey of Shapi and other host of management works of KNP.

Also there exists one watching shed from where sighting of Shapi-Himalayan Tahr can be done through binocular easily. In Phimphu, in order to have closer sighting of Himalayan Tahr, one has to reach Phimchu through old existing foot trail, which lead to Phimchu (Stream), having a distance of 1.50 kms. Here sighting can be done more closely, as Tahr feeds, mates, rests in these areas all day longs. Phimphu is not only the place important for sighting of Shapi but sighting of Musk Deer, Himalayan Black Bear, Goral, Serow, Assamese macaque, Common langur, Clouded leopard, Leopard cat, Marbelled Cat, Civet, Flying Squirrel, Common Squirrels, Monal Pheasants, Kaliz and host of other birds, butterflies and insects.

#### SHAPI - HIMALAYAN TAHR (Hemitragus jemlahicus)

Many of the Eastern Himalayan mammals and birds were actually discovered during the second and half of the 19<sup>th</sup> century, but the discovery of Shapi remained secluded until the expedition of Dr. Ernest Schaefer, a German National, to Tibet during 1938, found it in Phimphu. There are several reasons for the late discovery of the species. The first being that as a sacred animal of the locals, it was a real "taboo animal" of the Lepchas and always hidden from exposure. Secondly, it lived far off from any road head in an inaccessible area, close to tree limits and snowy mountainenous tracts.

Thegenus of Shapi Hermitragus is geologically reported to be very old as compared to deer, goat or sheep and dates back to the Pleistocene, the latest tertiary age, i.e.10-15 million years back in the evolutionary history of our earth. Long before ice-age, about one millon years ago, different relatives of Shapi were prominently scattered throughout the whole Indian sub-continent and mountain country of the Middle East, spreading as far as the Australian Alps (High Mountain range ) and further into foothills of the Pyrennes (Mountain Range of Southern France ).

Due to the formation of the main Himalayan and Alpine ranges, which form the backbone of the entire Eurasian Continent and subsequent climatic transformation, the continuous area of distribution was disrupted. As a result, all the European relatives of our Shapi were destroyed and only four representatives survived to our day. One is in the highlands of Arabia on Oman. It is smaller in size with more slender horns than its Indian relatives. Another, the Nilgiri Tahr is in the Nigiri hills with a little longer body-build and with brown to coffee coloured smooth coat. The third, that is, the Himalayan Tahr of Western Himalayas. Shapi of Sikkim with curved horns is related to the Western Himalayan Tahr, but is much bigger, shaggier, with a high rump, a muzzle like Takin and is altogether clumsier. During 1944 Pohla designated the Shapi of Sikkim, a new subspecies of Himalayan Tahr from Sikkim, Hermitragus jemlahicus schaeferi based on minor differences in pelage color, horn shape and discovery made by Dr. Ernest Schaefer in Phimphu during his Tibet expedition in 1938. He has described this species as "one of the most precious assets and pride of Sikkim". Even it was in tale that Dr. Schaefer hunted tahr in the Phimphu valley and understood to have stayed in one of cave above Phimphu for a number of days for tahr. And today the cave is popularly known as German-Orar.

Between Phimphu and Managdang (Blkmatar), Shapi occupy diverse habitats due to climatic reasons. During summer starting from May till September, they remain near timber line as well as above timber line in the Bikmatar valley, foraging upto Tepala, Shingotso, Lhamu, Angden, Ridges of Kishongla. And during first break of snowfall in early winter Shapi gradually migrates down to lower valleys crossing Shingotso, Tepala, Bikmatar and settles in German-Orar and PhimphureachingviaPemikhangchenandPemalhatso Lake. Shapi stays in Phimphu during entire winter



seasons i.e. from mid of November to late of April. And some of herds migrates towards Saathdharey (Dzongu) which is within the Bikmatar valley area. Phimphu and Managdang (Bikmatar) are not the only zones where Shapi are abound but it is also on record of harbouring idle size of population of Shapi in KNP area of west Sikkim i.e. in Aralungchok, Samitey, Dzongri.

**HABITAT:** The habitat area of Shapi is mainly composed of barren rocky hill cliffs, upon steep boulder grounds with gregarious patches of grass, Tsuga and Abies are dominant trees in scattered oak forest intermingled with bamboo at the second level and tubers and rare palatable grasses on a thick mat of leafy humus. The Shapi - *Hermitragus jemlahicus schaeferi* is usually found on the exposed rocky cliffs and open steep to very steep boulder grounds. Some of Shapi often harbours in conifer-oak forests. They descend down during winter months and roam at the periphery of conifer-oak forests and bamboo forests. They quite often come out to the open land in search of grasses and mineral deposits.

**CHARACTER:** Shapi in Sikkim gradually migrates down to lower valleys from early winter, probably due to cold and snow in the upper ridges and when grounds starts covering by snow. And also Shapi probably prefers site with southernly exposure, where during winter sun shine remains longer from early rise to dawn. They also prefer the cliffs broken by ledges and platforms, grassy slopes and thickets of mixed rhododendrons, bamboo (*Arundinaria spp.*), conifers forest on which they forage and in which they retreat. Usually Thar population in Phimphu valley varies from

15 to 17 every year. But surprisingly this year on 28<sup>th</sup> March, 2015 team headed by me for head count survey as well as on combing operation recorded sixty numbers of Shapis from four different sites in Phimphu valley. A few adults rams are at their majestic best size, as large as one year old yak calf standingaboutthreefeethighatshoulder, haveshort but massive laterally flattened horns, body with dark-brown coat, shaggy, thick fair mane around their neck and breast and from the throat, a scraggly beard drapes. Females are comparatively smaller in size. They form a group of at least 6 to 7 and forage scattered but in times of danger, one of them as guard give off warning call 'peek' and hurriedly move up united towards the steep cliffs.

In winter, when the ground is covered by snow, they stand still under the trees or thickets for hours. Duringpleasantweather, they comeoutfrom thickets in the morning and forage till dusk. At day time when the sun is overhead, they prefer to make themselves comfortable on bigflat boulders or ledges in the open eroded areas.

#### SOME OF THE REFERENCES ARE OF:

- 1. Respected Late. Sir C. Lachungpa, IFS, Ex-CCF,FEWM Deptt. Shapi, an article in Bi-Annual News Letter 1993, produce by the State Forest Department.
- 2. Respected Shri: Gut Lepcha, Retired CF (Wildlife) IFS, 'The SHAPI - Our rarest animal', an article in PANDA A Bi-Annual News Letter, 1994, produced by the State Forest Department.



Camera trap picture of Clouded Leopard at Phimphu

Camera trap picture of Himalayan Black Bear at Phimphu





#### शम्मानपत्र Certificate of Nonour

भारत की जननणना 2011 के बीरान इसाधारण उत्साह और उच्च कोटि की सेवाओं के उपनथ्य में भारत के सम्दर्भतिनी उद्दम गुरुद्द, प्रभारे अधिकीर को जननणना रजत पत्रक सहयं प्रवान करने हैं।

The President of India is pleased to confer upon Mr. West Gurung, Charge Othere Census Silver Medal in recognition of the outstanding zeal and high quality of service rendered during the Census of India 2011.

and fittedit New Delhi fittedite: Date: 31(-3-115 and memore, more service: Ministry of Home Affairs, Government of India

्रि - प्रेस न्यू विश्वे वी. व. प्रवाद्यविद्धि तरन की व्याननिकल्डून्ट वृत्त व्यावस्थाना आयुक्त Dr. C. Chandramouli Registrar General & Cansus Commissioner of India Three State Forest Officers conferred Census Silver Medal in recognition of the outstanding zeal and high quality of service rendered during the Census of India 2011



Shri Pradeep Subba, Range Officer (Lachung Territorial Range) receiving the certificate and medal from the Hon'ble Governor of Sikkim Shri Shrinivas Patil



Shri Milan Kumar Subba, Range Officer (Environment & Soil Conservation, Sombaria, West) receiving the certificate and medal from the Hon'ble Governor of Sikkim Shri Shrinivas Patil Three State Forest Officers namely Shri. Udai Gurung, Addl. Director (SBFP) as Charge Officer (Census duty), Shri. Pradeep Subba, Range Officer (Lachung - Territorial) and Shri Milan Kumar Subba, Range Officer (E&SC-West) as Enumerators (Census Duty) were conferred Census Silver Medal in recognition of the outstanding zeal and high quality of service rendered during the Census of India 2011. The medals and certificates were presented by the Hon'ble Governor of Sikkim, Shri Shrinivas Patil at Raj Bhawan, Gangtok on 21st February 2015.

Hearty Congratulations

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