

BIODIV News



Bulbul
Courtesy : Neeraj Mishra

Editorial

Dear Readers,

Biodiversity is all we have. Living things provide humankind's food, fabric, fibre and pharmaceuticals; they pollinate crops, generate oxygen and recycle water. The wealth of nations is built upon biodiversity: even the oil and coal dug from the ground were once a living tissue. So the case for the conservation of life's variety ought to be obvious.

Biodiversity is a problem in four parts.

1. We do not know **what we have**,
2. **Cannot identify** much of what we have, and
3. Have **not been able to yet count** what we have;
4. nor do we know **how** these unidentified **species interact with and depend upon each other**;

yet we are extinguishing this richness at a rate perhaps unparalleled in the 3.5bn year history of life on Earth ! We have as yet no masterplan with which to address any of the above challenges.

Education, awareness and involvement are essential for helping individuals and communities to develop the knowledge, values and skills necessary to understand appreciate and manage biodiversity. To encourage people to act we have started training programs by the UP State Biodiversity Board. These training programs are for Government staff, officers, teachers, students or public. We will measure the completion of our objectives in training by the number of people we train and those who participate in our training programs.

It is my firm belief that every individual has a role in biodiversity conservation. Raising awareness and encouraging people to know about biodiversity is an important aspect in encouraging people to act. And although the cost of conserving biodiversity will be considerable, the price of not doing so could be truly terrible!!!!

– Editor

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1. Sedges have Edges

Sanjay Mishra, Devendra Kumar Chauhan

Department of Botany, University of Allahabad, Allahabad, India

Sedges are predominant plants in many wetlands, with some species forming nearly pure stands over large areas. The sedges are not only diagnostic of different wetland types but also serve as the preferred food for many wetland animal species and provide important hydrologic and landscape modifying functions. Knowing the sedges and being able to identify them is, therefore, fundamental in the identification of wetlands as well as for understanding the functioning and importance of wetland ecosystems. They are adapted to live in both wet and dry environments.

Usually these plants tend to go unnoticed by those visiting bird sanctuaries and wetlands. This is partly because sedges don't have eye-catching flowers, and also because they are mostly found in wet areas that aren't always easily accessible. While sedge may not have a typical flower, an up-close look at the plant reveals its beauty; the flowers of sedge have been reduced to scales or bristles that can be quite intricate in form. While sedges appear similar to grasses, they are actually in a different plant family. There is one characteristic of the sedge family that can be used to differentiate it from the grasses, and it is best remembered with the anonymous rhyme “**sedges have edges, rushes are round, grasses are hollow right up from the ground.**”

Table 1. A comparison of the families Cyperaceae, Poaceae and Juncaceae.

Cyperaceae (Sedge Family)	Poaceae (Grass Family)	Juncaceae (Rush Family)
Usually three-angled stems (sometimes terete, quadrangular, or lenticular)	Stems terete	Stems terete
Stems usually with solid pith	Stems with solid nodes and hollow internodes	Stems with solid pith
Leaf sheaths closed	Leaf sheaths open	Leaf sheaths open
Inflorescence a complex of spikelets (simple spikelet in <i>Eleocharis</i>)	Inflorescence a complex of spikelets	Inflorescence a complex of cymes
Perianth of 1-many bristles or hairs, or absent	Perianth hardly evident, apparently reduced to scale- like palea and tiny lodicule (inner series)	Perianth of six scale-like parts in two series
Stamens 3 (1-2, rarely 6)	Stamens 3 or 6 (rarely 1-2)	Stamens 6 (rarely 3)
Pistil of 2-3 fused carpels	Pistil of 2(3) fused carpels	Pistil of 3 fused carpels
Fruit an achene	Fruit a caryopsis (grain)	Fruit a capsule



Cyperus eleusinoides Kunth



Scirpus articulatus L.



Schoenoplectus lupinus (Nees) Parker



Cyperus deformis Kunth.



Schoenoplectus supinus (L.) palla



Isolepis setacea L.



Kyllinga brevifolia Rottb.



Cyperus corymbosus Rootb.



Bird foraging near sedge patches



Eleocharis dilcis (Burm.f.) Trin. ex Hensch.



Schoenoplectus littoralis (Schrader) Palla



Cyperus esculentus tuber (chufa sedge, nut grass, tiger nut sedge, Kasheru)

Although most sedges have three angled stems, but some like *Eleocharis* species are round in cross section. Common names can be confusing and are often derived uncritically, especially for grasses, rushes and sedges. The so-called bulrushes (*Scirpus* spp., *Schoenoplectus* spp.) and spike-rushes (*Eleocharis* spp.), are actually sedges. Likewise, the umbrella grasses (*Fuirena* spp.), and saw grass (*Cladium jamaicense* Crantz) are sedges, and the nutsedges (*Cyperus esculentus* L., *C. rotundus* L.) are often called “nut-grasses.”

The sedge family, or Cyperaceae, is the third largest monocot family, consisting of an estimated 5000 species in 104 genera (Goetghebeur, 1998). They have a cosmopolitan distribution, with more concentration in tropics. The largest genera (approximate numbers of species) are *Carex*, 2000 spp.; *Cyperus*, 550 spp. (excluding *Kyllinga* and *Pycneus*); *Fimbristylis*, 300 spp.; *Rhynchospora* and *Scleria*, 250 spp. each; *Eleocharis*, 200 spp.; and *Bulbostylis*, *Pycneus* and *Schoenus*, 100 spp. each (Goetghebeur, 1998). The sedge family is represented in Uttar Pradesh by 128 species belonging to 17 genera (Singh & Srivastav, 2004).

Sedge-dominated wetlands occupy a unique position in a transitional zone between aquatic and terrestrial system. Sedges provide the dominant source of energy during critical stages in the life cycles of many species of birds and mammals. They provide feeding, breeding, nesting, escape and staging habitat for waterfowls, Cranes and other migratory birds. In addition to these roles, sedges also provide habitat structure for production of macro invertebrates (invertebrates, crustaceans, insect larvae) that many other species of animals are dependent upon. Most wetland sedge species produce a large crop of water-dispersed fruits. These are eaten by a variety of animals, such as insects, water birds, passerines, and some mammals. The leaves are often used as nesting material, and some mat forming species provide shelter and nesting sites (Cooke 1997). Sedge and graminoid meadows (a mixture of sedges and grasses) provide critical habitat for nesting sites and protection from mammalian predators. Fish also rely on sedge dominated wetlands. Sedges also play an important role in supporting food webs by recycling nutrients and using energy for photosynthesis to produce biomass for primary consumers and, ultimately, also decomposers (Sather and Smith 1984). Sedges function under both aerobic conditions (above and within the water and air columns) and anaerobic conditions (rooted in wet soil or muck). They provide the opportunity for nutrient cycling between these extremes and create an energy flow in wetland ecosystems pumping nutrients to other organisms as they grow, die and provide detritus to other plants and animals inhabiting wetland ecosystems. Sedges serve to cycle nutrients faster than most masses characterizing these systems (Damman and French 1987). Sedges also improve water quality by acting as filters to remove pollutants and sediments (Sather and Smith 1984); some (e.g. *C. echinata*) have even been documented to remove heavy metals by plant uptake.

Wetlands, particularly sedge-dominated types at the interface between open water and more closed upland habitats, provide for extensive nonconsumptive uses of wildlife such as bird watching, wildlife photography and education (Rubec et al. 1988). Sedges also have social, economic and ethnobotanical roles or values for humans. In general, sedges contribute to the diversity and aesthetics of wetlands. Their importance is often at a regional or local level and the family plays a vital part in many local economies. It is probably due to their localized use that they have generally been overlooked as plants of economic importance.

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2. Wildlife Week: 01st -07th October 2013

U.P. State Biodiversity Board, Lucknow celebrated Wildlife Week in collaboration with Department of Zoology, University of Lucknow, Regional Science City, Lucknow and South Asian Network of the International Zoo Educators Association, Coimbatore Tamil Nadu. The programme aimed at creating awareness among the youth to have a passionate heart for the biodiversity around them. Wildlife Week provides an opportunity to the youth to express their thoughts through various competitions as well as to get involved in wildlife conservation through various field activities. The details of the events are as follows:



Programme Schedule

Date	Event/Theme
01-10-13	Wildlife Play on Wildlife theme like panchtantra stories
02-10-13	Debate in English and Hindi on भारत में वन्यजीव संरक्षण अधिनियम एवं नीतियाँ: प्रभावी या अप्रभावी Wildlife Conservation Acts & Policies in India: Effective or ineffective
	Poem recitation in Hindi and English on नन्हीं गौरैया "Little Sparrow"
03-10-13	Painting on Human and Animal Conflicts Ex: Tiger-human conflicts Elephant-human conflict Crocodile-human conflict Gharial-human conflict
	Collage on Freshwater Biodiversity
	Greeting card making (Wild Flora)
04-10-13	Power Point Presentation on "Biodiversity loss and Climate Change" Slogan Writing on Wildlife
05-10-13	Unnao Field Visit
06-10-13	Rangoli on Pollinators Pictorial Quiz on Wetlands

The 7 day programme for Wildlife Week started from 1st October 2013 at Regional Science City involving participants from more than 100 schools and Colleges of Lucknow. The Chief Guest Prof. Dinesh Sharma, Mayor, Lucknow City inaugurated the “Wildlife Week”. Mrs. Pratibha Singh, Conservator of Forests was the Guest of Honour and Prof. Aqil Ahmed, Dean Science University of Lucknow presided over the function. On this occasion, a “Wildlife Awareness Car” was also flagged off by the Chief Guest Prof. Dinesh Sharma, Mayor and Guest of Honour Mrs. Pratibha Singh, Conservator of Forests joined by Prof. Aqil Ahmad, Dean Science and Prof. Madhu Tripathi, Head, Department of Zoology, University of Lucknow. Mr. Neeraj Srivastava, the State Coordinator for Uttar Pradesh for Indian Bird Conservation Network delivered a lecture on “*Bird watching and their identification*”.



Flagging off “Wildlife Awareness Car”



Debate competition

On 2nd October, Debate and Poem Recitation Competitions were held on the topic “*Wildlife Conservation Acts & Policies in India: Effective or ineffective*” and “*Little Sparrow*” respectively. In these competitions, more than 200 students enthusiastically took part from more than 20 schools and colleges of Lucknow. A lecture on Biodiversity Conservation in India was delivered by Dr R. L. Singh (Retd.) Principal Chief Conservator of Forests. He briefed the participants about the biodiversity and its conservation in India.

On the 3rd day, Painting, Collage and Greeting card making competitions were held. More than 200 students took part from 25 different schools and colleges of the Lucknow. The topic of painting was “Human and Animal Conflicts”. Greeting card making competition was on the topic of “Wild Flora”. Collages were created on “Freshwater Biodiversity”. Power Point presentation



Painting, collage and greeting card making competition



Power Point presentation

On the 4th day, students expressed their views through power point presentation on the assigned topic “Biodiversity loss and Climate Change”. The students wrote slogans on Wildlife in slogan competition. The students also performed “Nukkad Natak” during the Wildlife programmes. The competitions were followed by Wildlife Conservation Rakhis as well as interaction between the experts and students. The wildlife photography exhibition was the centre of attraction for all. A lecture on “Enchanting Snakes: Our Friends” was also delivered by Dr.

Amita Kanaujia, Associate Professor, Department of Zoology, Lucknow University. More than 300 students from 25 schools participated. Rangoli competition

On the 5th day, all the winners of the competitions held till 4th October were taken to Nawabganj Bird Sanctuary, Unnao. The students learnt about bird watching as well as the dos and don'ts during field visits. They were shown the nesting of Asian-Open Bill in the sanctuary. Other birds seen were cormorants, pond herons and egrets. The migratory birds can be watched from November onwards in the sanctuary.



A view of Bird Sanctuary



On 6th day, Rangoli and Quiz competitions were held. The theme for Rangoli was "Pollinators". Students made eye-catching and attractive rangolis showing various pollinators such as bees, butterflies, ants, spiders, monkeys and bats. The students as well as the teachers enjoyed the game of snakes and ladders designed on wildlife with its dos and don'ts related to wildlife conservation. The students participated actively in the open quiz on wildlife. For the correct answer, they were felicitated with a pocket biology dictionary. A lecture on "History of Wildlife

Conservation in Uttar Pradesh" was also delivered by Dr. R.S Bhaduria PCCF, Wildlife (Retd.). More than 300 students from 30 schools attended the events.

The seven days Wildlife Week programme was successfully concluded with valedictory ceremony and prize distribution done by the Chief Guest Prof. S.B. Nimse, Hon'ble Vice Chancellor, University of Lucknow and Mrs. Sulabha Nimse, wife of Vice -Chancellor, University of Lucknow.

More than 800 students from 40 schools, colleges and universities with teachers participated in different events throughout the programme. Publicity materials on various aspects of wildlife conservation were also distributed among the students and general public. The list of prize winners of the Wildlife Week competitions is given below:

2. Results

A) Poster Competition

Group A Category: Vth – VIIth

S.No	Name	Name of School	Class	Result
1	Alok Singh	Riverside Academy, Gomti Nagar, Lucknow	V	First
2	Ankit Kumar	Central Academy, Indira Nagar, Lucknow	VII-C	Second
3.	Shikhar Yadav	Central Academy, Indira Nagar, Lucknow	VII-A	Third
4.	Nargis Bano	Avadh Academy Inter College, Chinhat, Faizabad Road, Lucknow	VII	Consolation



1st Prize **Alok Singh**



2nd Prize **Ankit Kumar**



3rd Prize **Shikhar Yadav**



Consolation Prize **Nargis Bano**

Group B Category: VIIIth – XIIth

S. No	Name	Name of School	Class	Result
1	Durgama Yadav	Riverside Academy, Gomti Nagar, Lucknow	X	First
2	Priyanka Birla	Rani Laxmi Bai Memorial School, Sec-C, Indira Nagar, Lucknow	XI-A3	Second
3.	Shweta Pandey	Rani Laxmi Bai Memorial School, Sec-C, Indira Nagar, Lucknow	XI-A2	Third
4.	Tanay Pandey	Central Academy, Indira Nagar, Lucknow	X-D	Consolation



1st Prize **Durgama Yadav**



2nd Prize **Priyanka Birla**



3rd Prize **Shweta Pandey**



Consolation Prize **Tanay Pandey**



Red Wattled Lapwing
Courtesy: Neeraj Mishra

Glimpses of various events organized during “Wildlife Week-2013”



Students taking vow to conserve wildlife



A view of exhibition



Students making greeting cards and collages



Students performing Nukkad Natak



A visit to Nawabganj Bird Sanctuary, Unnao



A view of Rangoli making competition

3. Visits/Trainings/Conferences

1. Shri Vijay Kumar, DCF, U.P. State Biodiversity Board, Lucknow delivered a lecture on "The various activities of U.P. State Biodiversity Board and U.P. State Biodiversity Board Rules, 2010" to Range Officers, Dy. Rangers and Foresters at Forestry Training Institute, Kanpur from 26-12-2013 to 28-12-2013.
2. Training Programme : **"Biodiversity: Law and Policy"**



Trainees at FTI, Kanpur, 26-12-2013 to 28-12-2013

A Three day - Training Programme on *"Biodiversity: Law and Policy"* was conducted by U.P. State Biodiversity Board, Lucknow at Forestry Training Institute, Kanpur during 26-12-2013 - 28-12-2013.

In all 27 participants from all over the state actively participated in this programme. Out of which, there were 07 Range Officers and 20 Deputy Rangers from the U.P. Forest Department. During this training programme, lectures on various aspects of biodiversity, law and policy were delivered to the trainees by the experts. The details of the programme and the list of participants are as follows:

2. List of participants attended the training program on **"Biodiversity: Law and Policy"** during 26-12-2013 – 28-12-2013 at FTI, Kanpur

Sl.No.	Name of the Participant	Designation	Name of the Division
1.	Shri. Ganesh Shanker Bhatt	Dy. Ranger	Bijnaur Forest Division
2.	Shri. Ayodhya Prajapati	Dy. Ranger	Kushinagar Forest Division
3.	Shri. Ram Baran Yadav	Dy. Ranger	Dudhwa Tiger Reserve
4.	Shri. Girraj Singh	Dy. Ranger	Kashganj Forest Division

<i>Sl.No.</i>	<i>Name of the Participant</i>	<i>Designation</i>	<i>Name of the Division</i>
5.	Shri. Radhey Shyam Diwakar	Dy. Ranger	Obra Forest Division
6.	Shri. Ram Sajeewan Pandey	Range Officer	Gajipur Forest Division
7.	Shri. Manoj Kumar	Dy. Ranger	Balia Forest Division
8.	Shri. Anuj Kumar	Dy. Ranger	Bhadohi Forest Division
9.	Shri. Chadra Pratap Singh	Dy. Ranger	G B Nagar Forest Division
10.	Shri. Fateh Bhadur Khan	Dy. Ranger	Pratapgarh Forest Division
11.	Shri. Bhaiya Satish Chandra Singh	Range Officer	Sohagibarwa W L Division
12.	Shri. Narendra Pandey	Dy. Ranger	Gorakhpur Forest Division
13.	Shri. Shobharam Ojha	Dy. Ranger	Sohagibarwa W L Division
14.	Shri. Ramdeen	Dy. Ranger	Raebareilly Forest Division
15.	Shri. Jagendra Singh	Range Officer	Muzzafarnagar S F Division
16.	Shri. Nahar Singh	Dy. Ranger	Etah Forest Division
17.	Shri. Suresh Kumar Singh	Dy. Ranger	Jhansi Forest Division
18.	Shri. S N Singh	Range Officer	Raebareilly Forest Division
19.	Shri. Awadhesh Kumar Verma	Dy. Ranger	Raebareilly Forest Division
20.	Shri. Rakesh Chaturvedi	Dy. Ranger	Siddharthnagar Forest Division
21.	Shri. Kalyan Singh	Range Officer	Meerut S F Division
22.	Shri. Deewan Chandra Arya	Range Officer	Forest Research, Kheeri
23.	Shri. Virendra Pratap Singh	Dy. Ranger	Silva, Southern Region, Kanpur
24.	Shri. Intejar Ahmed	Dy. Ranger	Forest Survey Division, Lucknow
25.	Shri. Ram Nath Ram	Dy. Ranger	Deoria Forest Division
26.	Shri. Devendra Singh	Range Officer	Agra Forest Division
27.	Shri. Rakesh Chandra Srivastava	Dy. Ranger	Sonbhadra Forest Division



Sarus Crane
(Courtesy :
Abhay Raj Singh)

7. Newspaper Clippings

(i) International News

THE HINDU | LUCKNOW, MONDAY, OCTOBER 7, 2013

A NOVEL IDEA SPROUTS



A Palestinian woman waters plants growing in tear gas canisters in the village of Bilin, near the West Bank city of Ramallah, on Sunday. The tear gas canisters were collected by Palestinians during years of clashes with Israeli security forces. - PHOTO: AP

07th October, 2013 : New use of tear gas canisters in city of Ramallah.

6 YOUNG WORLD

THE HINDU • TUESDAY, OCTOBER 29, 2013

Rocky Mountain HIGH

A visit to the Canadian Rockies will knock you out on two counts. One, the breathtakingly beautiful mountains and the other, the lengths gone into to ensure that the environment is preserved.



At Banff

At the Banff National Park it is stated that visitors must give wildlife space as they are the important inhabitants; and that it is "against the law to touch, entice, disturb or otherwise harass any wild animals big or small". For the same reason, your own pets must be put on a leash as they may harass or provoke the wildlife. You are not allowed to feed the wildlife, and coolers are to be stored in vehicles. Bear-proof bins are placed within the park (bears are not uncommon in the Rockies) and all garbage must be disposed in these bins only. It is the tendency of visitors, especially tourists, to take away flowers, feathers, branches, rocks or antlers/animal remains as souvenirs. However, the Canadian law states that "it is unlawful to collect or remove any natural objects or historical artefacts (this includes berries, wildflowers, mushrooms, antlers, wood, interesting rocks along the river, etc.)".

29th October, 2013 : The Canadian Rockies are a UNESCO World Heritage site. Through these mountains are a target for commercial and economic exploitation—they encourage tourism and allow visitors to enjoy the Rockies but also ensure that it is done in harmony with the environment—we need to pick up!

Newspaper Clippings

14

nation

hindustantimes

SUNDAY HINDUSTAN TIMES, LUCKNOW
NOVEMBER 03, 2013

BT brinjal on hold in India, but may find its way in via Bangladesh

Zia Haq

z.haq@hindustantimes.com

NEW DELHI: Bangladesh has approved four varieties of the genetically-modified Bt brinjal for cultivation, fuelling concerns that seeds of the transgenic crop could slip into India through a porous border with West Bengal, the largest brinjal growing state.

After a fierce debate, India put Bt brinjal under an "indefinite moratorium" in 2009 despite approval from the Genetic Engineering Appraisal Committee, the country's bio-

tech regulator. Bt brinjal's effect on biodiversity is a key concern as it could push out several traditional varieties in India, which is the centre of origin of the vegetable, plant biologists say.

The Coalition For a GM Free India, a federation of several anti-GM groups, has urged the environment ministry to ensure Bangladesh's Bt brinjal varieties do not infiltrate into India.

Its concern stems from earlier instances of 'backdoor entry' of GM seeds when Monsanto's illegal Bt cotton seeds began to be grown widely before

being cleared by the regulator, prompting India to formally approve its use in 2002.

"The GM industry is known to have deployed this strategy to get faster approvals," says the Coalition's letter to environment minister Jayanthi Natarajan.

Once seeds find their way into fields, there is no effective way to recall them. They can spread quickly across regions.

The then environment minister, Jairam Ramesh, had said there was no "overriding urgency" to approve Bt brinjal. Six premier Indian science acad-

emies, tasked with evaluating Bt brinjal by Ramesh, had declared Bt brinjal safe, but their findings said all transgenic articles posed a risk if the science behind it was flawed. India's most well-known biologist PM Bhargava had led several scientists to present a dossier that had highlighted key safety issues with Bt brinjal.

A standing committee of India's Parliament, which examined the issue, later recommended a probe into the way Bt Brinjal had been cleared, stating that regulators might have been under pressure from the biotech

"industry and a minister" to approve Bt brinjal, calling it a "collusion of the worst kind".

Bangladesh's Bt brinjal varieties are based on a technology developed in India under a public-private collaboration by the Maharashtra-based seed company Mahyco, with a key gene supplied by US firm Monsanto.

In GM crops, the genetic material (DNA) is altered for improvements in its qualities. Bt Brinjal, for instance, has been inserted with a natural bacterial protein, CryIac, which makes it resist pests and does away with pesticides. However,

GM crops are opposed due to perceived risks. On-the-shelf GM farm produce aren't labeled as such, and consumers cannot ordinarily distinguish between non-GM and GM food.

GM crops, which can improve yields, are being pushed not just by private firms, but also by state-driven research institutions, as developing countries struggle to increase agricultural productivity. Emerging economies, such as Brazil, Argentina, India and China, now account for nearly half of the world's over 134 million hectares of transgenic crops.

03rd November, 2013 : Bt Brinjal was put under an "indefinite moratorium" in 2009 by India's Genetic Engineering Appraisal Committee –the country's biotech regulator. Now Bangladesh has approved four varieties of Bt-Brinjal. India is the centre of origin of Brinjal and West Bengal is the country's largest brinjal growing state. How do we prevent these seeds coming in through a porous border?



(Courtesy : Debanshu)

Newspaper Clippings

(ii) National News



the pioneer
LUCKNOW WEDNESDAY | OCTOBER 2, 2013

Mission Himalayan Quail launched

PARITOSH KIMOTHI ■
DEHRADUN

Last seen in 1876 in the Nainital region, the Himalayan Quail is feared to be extinct, but there have been some unconfirmed sighting of this bird in parts of Uttarakhand in recent years. The State Forest Department has now launched Mission Himalayan Quail as part of which the Nainital Zoo is offering ₹one lakh to anyone who provides irrefutable proof of this bird's presence in the State.

According to the Nainital divisional forest officer and director of the Nainital Zoo, Parag Madhukar Dhakate, the Himalayan quail was last sighted in 1876 at Sher Ka Danda in Nainital. This medium-sized bird belonging to the pheasant family was once quite common



The Himalayan Quail Courtesy: *Diseaux.net*

in the State and in the later part was seen in Mussoorie and Nainital areas.

"In the 137 years since its last reported sighting, there was no confirmed sighting of this bird and there was dearth of specific searches for this bird. Through Mission Himalayan Quail, we want to involve villagers and facilitate capacity building in the department. Only forest staff and villagers on the fringe of forests frequently visit the jungle so the chance of either of these spotting the bird are good. I think the chances of this bird being rediscovered in the State are good. The aim of this mission is to scientifically ascertain the presence of the Himalayan quail in the Himalayas of Uttarakhand," said Dhakate. The department will accept photograph, video film or even observation report of the bird in a partic-

ular area. Based on reports of observation, camera traps will be installed in the said area and on rediscovery of the bird, the person who informed about the presence of the bird will be rewarded.

The Nainital DFO further said that the department is undertaking genotyping of the eight birds of the pheasant family found in Uttarakhand. "Since we do not have any specimen of the Himalayan quail at present, we are trying to secure a sample from Europe where 12 bodies of this bird are preserved in five museums," said Dhakate.

The Himalayan quail was found in grassy land between 1800 and 2300 metres altitude. It was once common in the State, but was also considered a game bird which is considered to be the major reasons for its extinction.

02nd October, 2013 : The Uttarakhand Forest Department has launched "Mission Himalayan Quail" and is offering Rs. One lakh to anyone who can provide irrefutable proof of the birds presence in the state. The last authentic sighting was made 137 years age!

Newspaper Clippings

THE HINDU LUCKNOW, THURSDAY, OCTOBER 10, 2013

SUNDAY HINDUSTAN TIMES, LUCKNOW, OCTOBER 13, 2013

Conserving the nearly extinct navara red rice organically

The variety is presently being sold for Rs. 400 a kg

M. J. PRASU

The Navara Eco farm is nestled on the banks of the quietly flowing Shalagramathi river in Chittur Palghat district, Kerala. The unique aspect of the farm is that it has the largest navara rice growing field (12 acres) in the State.

"Navara is a medicinal rice variety and its cultivation is almost extinct. Many reasons such as poor availability of pure seeds, low yield and high production cost are attributed for this. The specificity is that this is the only organically grown navara rice farm in the region," says Mr. P. Narayana Urs, a third generation marketing sensitive-turned-farmer, running the everyday activities of the farm.

Unlike other rice varieties, which are white in colour, navara is deep red and



GUIDING FORCE: Mr. Narayana Urs says sowing pure seeds was difficult. — MITHUN K. JAYARAJ

seeds and gradually moved into cultivating solely navara rice in my 12 acre farm," he says.

Concept

During this time, he turned to organic farming in a serious manner and gradually evolved the concept of Navara Eco Farm.

"The journey was not

smooth for me to catch the pests using ayurveda."

Being a traditional variety it was grown organically but because of its poor yield and difficulties in controlling pests and diseases conventional method of farming was adopted by some interested farmers to conserve it.

Many moved away regarding other hybrid rice varieties.

The crop is sown for male directly in the main field during April and harvested in June. Once the seeds are collected and cleaned it is again sown in December and harvested in February (90 days crop).

Selling price

Approximately from an acre 200-250 kg are harvested. The variety is presently being sold for Rs. 400 a kg through personal contacts.

But why organic? Can we not grow this crop using fertilizers?

"Since it is a medicinal rice variety for consumption we decided to adopt only organic methods. We did not want the chemical residue in the harvested grains," explains Mr. Urs.

Over the years the farm has been able to educate the neighbours on effective farming methods specifically tailored

for this type of rice farming. Today the workers paid either grown on the best practices being followed at the farm, according to Mr. Urs.

Several awards

The several awards and recognitions conferred by State, central governments and other leading agriculture institutions seem to prove the importance of his work.

Recently the Protection of Plant Varieties and Farmers' Rights Authority conferred the special annual Best Genotype Service certificate recognizing Urs on his farm.

"The farm has also formed rice clusters for women and got it registered under Geographical Indication through farmer-led initiatives. The Geographical Indication (GI) tag was granted in 2006," says Mr. Urs.

Many students, students, officials of various government departments and agencies are visiting the farm to learn about this variety and its cultivation details.

For details interested readers can contact Mr. Narayana Urs at Navara Eco Farm, Karakkulam Kalan, Chittur Palghat P.O., Palakkad Dist., Kerala, India. Pin: 686 504, Phone: 04828-281075 and 222277, email: naysara@rediffmail.com, Mobile: 09447377749.

FARMER'S NOTEBOOK

has been cultivated in the Palghat region for more than 2,000 years but in the last 40-50 years it has come close to being completely wiped out due to several new hybrid varieties being introduced.

Focus

After taking over the farm's management about 17 years ago, Mr. Urs decided to turn his attention to conserving native rice varieties in the region. He figured out that many of the traditional varieties are fast becoming extinct.

"I desired to work on conserving this specific rice because, apart from being a traditional variety, it is well known among the local farmers. After years of strenuous effort I was able to collect and segregate enough

crop," says Mr. Urs and adds "conserving the variety proved an almost impossible task because sowing pure seeds seemed uphill."

In some places the variety was already contaminated by other hybrid varieties. In addition the low yield (200 kg from an acre) made the cultivation commercially unviable.

Added to this were problems faced during conversion to organic farming.

According to him, conversion to organic farming in organic rice was not very remunerative, but his interest pulled him on.

Pest control proved a major challenge. "Tulsi and marigold were planted in the field bands to repel the illegal stamens. Our pests damaged our four acres. For the next cropping season we

hindustan times

TULSI, A HERBAL FIX FOR ALMOST EVERYTHING

HEALTH WISE



SANCHITA SHARMA

I have tulsi (holy basil) in a pot that I use to flavour my tea and a Genovese basil (ocimum basilicum) bush I use for salads and pastas. I was happy with my very little herb garden until Krishna Gupta of Organic India informed me that holy basil — Krishna (purple leaves), Rama (small, green leaves) and Vana (larger, green leaves) — can grow almost two metres high.

I was shattered. My plants are midgets, barely a foot high. The tulsi crop that small farmers grow in their tiny holdings in Bundelkhand and Azamgarh for Organic India — the organic products, tea and herbal medicine company has 3,500-acre under Tulsi cultivation — are over 6 feet high. Even the tulsi shrubs Gupta has planted in his neighbourhood park in Gurgaon's Block-A of Sushant Lok are a lot higher than people who have started walking and doing pranayam (yogic breathing exercise) at the tulsi park.

So I was relieved when told that in this case, size really doesn't matter. All you need are ten fresh leaves of tulsi a day to get the herb's full health benefits, said Dr Marc Cohen, Foundation Professor of Complementary Medicine at RMIT University in Australia. What makes Dr Cohen — who has degrees in western medicine, physiology and psychological medicine and PhDs in Chinese medicine and biomedical engineering — an expert is his massive review of existing peer-reviewed scientific studies on tulsi, which are coming out as a book called *Herbs and Natural Supplements: an Evidence-Based Guide*.

Though research has picked up over the past decade, most studies have been done on animal models. Since I can't list tulsi's very many virtues in limited space, I've put together a representative sample.

Tulsi is a potent adaptogen that lowers cell sensitivity to stress and raises the body's ability to adapt to changing situations. This means you can chew the herb for practically everything, from anxiety cough, allergies, asthma, fever, diarrhoea, indigestion and vomiting to heart disease, arthritis and snakebites (Mohan, Amberkar et al 2011). It's antioxidants content is as high as ginger, garlic, pink grapefruit, red grapes and plums. As in grapes, the anti-oxidant content of dark tulsi is higher than the green ones.

In diabetics, it reduces fasting glucose

levels, blood cholesterol and triglycerides (Muralikrishnan, Pillai et al 2013), reduces plasma glucose and HbA1c — the test to measure average level of blood glucose over three months — and lowers diabetes-related vision damage (retinopathy). It was shown to lower cholesterol in people in a small human trial (Verma, Dubey et al 2012).

It lowers the toxic effects of common pesticides such as endosulfan, and protects against liver toxicity caused by painkillers such as paracetamol and drugs used to treat tuberculosis and cancers. In animal models, extracts lower tumour size and increase cancer survival (Monga, Sharma et al 2011) while lowering radiation-induced damage to cells and DNA (Subramanian, Chinatawar et al 2005) associated with cancer treatment. Leaf extract protects genetic damage from chromium and mercury poisoning (Babu and Maheshwari 2006).

All varieties are high in Vitamins A and C, zinc, calcium, iron and chlorophyll (Shafiqatullah, Khurram et al 2013), which is obvious to anyone who's made fresh pesto sauce at home. Its anti-inflammatory that lowers

infection and water retention (edema).

The asolic acid in tulsi lowers anxiety as effectively as drugs like diazepam (Peminati, Gopalakrishna et al 2011) and depression as well as the tricyclic antidepressant drug, imipramine. The cognitive edge it gives doesn't end here. It improves working memory, reference memory and spatial memory in not just rats with stress-induced brain impairment (Raghavendra, Maiti et al 2008).

Apart from stress, it increases stamina and fights fatigue. In rodent models, tulsi extract normalised physiological and biochemical changes linked with tiredness and mental stress. Extracts helped rats swim longer and utilise glucose better (Prasad and Khanum, 2012). Other studies have shown it reduces stress-related oxidative damage on the heart, skeletal and brain tissues.

Tulsi is extremely safe even in high doses, with the ratio between the lethal and effective dose being more than 300 (Singh 2010). The only red flag is that its anti-platelet action could theoretically interact with blood-thinning medicines and cause bleeding in surgery, and its strong anti-diabetic action may interact with diabetes medication, but no actual cases have been reported.

By the end of Dr Cohen's tulsi anthology, I decided to treat my tulsi pots like a medicine box in the hope they grow and help lower my medical bills.

sanchita.sharma@hindustantimes.com

10 October, 2013 : "Navara" is a variety of rice grown in Palghat district of Kerala. It is deep red in color and has been cultivated for over 2000 years but now on the verge of getting wiped out. It is a low yielding variety 200 kg/acre and this is commercially invisible. Currently it is sold at Rs. 400/Kg through personal contacts. They have a registered geographical Indication for this too.

13th October, 2013 : A tulsi anthology! This means one can chew on its leaves for anything from anxiety, cough, allergies, asthma, fever, diarrhea, indigestion, arthritis and snake bites!

Newspaper Clippings

THE TIMES OF INDIA, LUCKNOW
MONDAY, OCTOBER 21, 2013

TIMES NATION

East Himalayan forests turning brown: Study

Jayashree Nandi | **TNN**

New Delhi: In what appears to be another grim outcome of climate change, a study has found that forests in eastern Himalayas are gradually 'browning', with trees withering and foliage declining even during productive seasons. Similar changes were noted in tropical mountain forests across the world.

The study used satellite images from 1982 to 2006, which revealed a common trend: mild greening till the mid 1990s and then a sudden and steady reversal which is making these forests appear drier and brown.

The study has been accepted for publishing in the *Global Change Biology* journal. A study has found a wor-

TREES WITHERING

► **Kangchendzonga and Namdapha** national parks in Northeast among tropical mountain forests across world found to be turning 'brown'

► **Satellite study finds trees withering & foliage declining**

► **This may mean reduced photosynthesis** due to temperature rise

rying increase in 'browning' in forests in the eastern Himalayas. This may mean that the trees in these forests are not able to transpire at the optimum level and their photosynthesis activity has reduced due to temperature rise.

Among the 47 protected areas across five biodiversity hotspots selected for the

study, were Kangchendzonga national park in Sikkim and Namdapha national park in Arunachal Pradesh.

"One would imagine that the mountains would become more green with the rise in temperature, but it is not so," said Jagdish Krishnaswamy, one of the authors and a scientist at Ashoka Trust for Research in

► **Moisture stress, P 7**

Ecology and Environment (ATREE). "There is a temperature induced moisture stress which is causing the trees to wither. There is less foliage even during the most productive time of the year in almost all the five regions we have studied." The study also points to a complete loss of certain moisture regimes in these forests.

21st October, 2013 : Study of Satellite images from 1982 to 2006 is showing a disturbing trend in Eastern Himalayas. The forests are browning usually a warming would mean more greening due to more photosynthesis. But it is not so loss of moisture is turning these areas brown.

THE HINDU | LUCKNOW, THURSDAY, OCTOBER 31, 2013

Colossal waste for India

DIVYA GANDHI

By the turn of the century India could catch up with some of the world's most affluent countries in at least one indicator of urban growth: garbage production.

In the next 12 years alone, South Asia — and 'mainly India' — will be the fastest growing region for waste generation, says a paper published today (Oct 30) in *Nature*. Garbage generation in South Asia will increase eight-fold by year 2100 to reach two million tonnes a day, bringing the region at par with the conglomerate of the world's 34 most developed countries including U.K., U.S., Australia and Japan, which make up Organisation for Economic Co-operation and Development (OECD) countries.

By 2100 "India's total waste generation will be 70 per cent of all the high-income and OECD countries put together," Perinaz Blazquez-Tate, co-author and solid-waste consultant in Dubai, United Arab Emirates, told this Correspondent.

While India's per capita waste generation rate will still be lower than most affluent countries, "the sheer size of its population and expected increase in urbanisation and a rapidly-expanding middle class," will account for the colossal amount of waste it generates in total, she added.

With India becoming the most populous country in the world before 2030 and its projected economic growth



OBVIOUS DISTINCTION: It is only a matter of time before India is the world's largest municipal solid waste generator.

— PHOTO: SHARAD KUMAR

rate, "it is likely only a matter of time before India is the world's largest municipal solid waste generator," Daniel Hogenweg, lead author and associate professor of energy systems at the University of Ontario Institute of Technology in Oshawa, Canada, told this Correspondent.

"A country's total solid waste is a function mostly of the number of middle class (and above) who almost all live in cities. India will probably surpass the U.S. and then China as the world's single largest solid waste generator," he added.

The research paper describes the staggering trajectory of global urban growth and waste generation over the last century.

In 1900, the world's 230 million urban residents produced less than 300,000 tonnes of rubbish per day, comprising relatively innocuous "benign" household

items, such as food waste and packaging" per day.

By 2000, 2.9 billion people were living in cities; and by 2025 garbage production will reach 6 million tonnes a day, a quantity that will be "enough to fill a line of rubbish trucks 5,000 kilometres long every day."

The world's cities together will be producing garbage in excess of 11 million tonnes per day by 2100, which is over three times today's figure.

However, "as city dwellers become richer, the amount of waste they produce reaches a limit," says the paper.

While the authors do not believe that this 'peak' will happen this century, they say that through a move to stabilise population growth, manage cities better, and with greater equity and use of technology, the peak could come forward to 2075. "This would save around 2.6 million tonnes per day."

31st October, 2013 : India is all set to catch up with the world's most affluent countries at least is one indicator of urban grown garbage production! With India set to be the world's most populous country by 2030- we are all set to be the world's largest municipal solid waste generator. Hope planners are thinking about this!

Newspaper Clippings

LUCKNOW
THE HINDU • WEDNESDAY, NOVEMBER 6, 2013

Wildlife centre replaces night safari at zoo

D. Madhavan

CHENNAI: The advanced research institute for wild species, proposed to be set up in Vandalur zoo, will come up on a portion of land earlier earmarked for a night safari project.

In 2007, a night safari was proposed on the 92-hectare rescue and rehabilitation centre of the Anna Arignar Zoological Park at a cost of Rs. 256 crore but the project was shelved due to paucity of funds.

Now, around five acres of that space will be used to set up the advanced research centre for wild species. "The new centre will be a state-of-the-art facility for research on rare species, especially endangered ones, including the lion-tailed macaque (LTM) and Nilgiri langur," said an official of the State forest department.

The Advanced Institute of Wildlife Conservation Centre (AIWCC) will be set up at a cost of Rs. 27.13 crore and will provide information on wildlife, apart from hosting a research laboratory.

It will feature four divisions



The wildlife centre will be a state-of-the-art facility for research on rare species, especially endangered ones, including the lion-tailed macaque and Nilgiri langur — FILE PHOTO

— on migratory birds, survival of species, genetic study and education. On the migratory birds, the centre will study the migratory pattern, routes, species and locations they visit.

The species survival division will deal with specific studies on 13 identified indigenous species including LTM, Nilgiri langur, elephants, ti-

gers and black sheep, while the genetic division will look into gene composition and associated functions.

The education division will deal with publication of research papers and dissemination of the studies conducted at the centre.

The Anna Arignar Zoological Park, popularly known as Vandalur zoo, is spread across 602 hectares and is home to 1,541 animals. It attracts more than two million visitors every year.

Currently, wildlife researchers attached to the forest department are involved in the collection of basic materials such as cells, eggs and tissues of endangered species, for research. The past six months, they have travelled to various forest research institutes in the country to collect the material.

The centre will also have branches in Kodaikarai, Kanyakumari and Coimbatore. As per estimates, the centre in Vandalur will need at least two scientists and four junior-level researchers. A deputy director has already been appointed.

06th November, 2013 : A Rignar Anna Zoological Park popularly known as Vandalur Zoo is spread over an area of 602 hectares and is home to 1541 animals. An advanced Institute of Wildlife Conservation Centre (AIWCC) is soon to be set up here.

LUCKNOW
THE HINDU • FRIDAY, NOVEMBER 15, 2013

Amur falcons, satellite-tagged in Nagaland, tracked over Arabian Sea

Sushanta Tyntkar

BIMBAESI: Amur falcons, Naga and Paragi, which were satellite-tagged in Nagaland, were on Thursday tracked flying over the Arabian Sea, the most difficult stretch of their migratory routes, after passing over Bangladesh, the Bay of Bengal, Andhra Pradesh, Karnataka and Maharashtra towards their final destination in South Africa.

The third falcon, Wokha, was tracked flying over the Bay of Bengal.

Principal Chief Conservator of Forests and head of the Forest Extra, Nagaland, M. Lukensara Rao told *The Hindu* that the tracking began soon after the three birds were released on November 6 after satellite tags with an antenna and solar panel, weighing five grams, had been fitted on their back by a team of scientists.

"For the scientists, the arrival of Amur falcons in Nagaland on their long migration from Mongolia to South Africa is still a mystery. On their return flight, they will fly over Bangladesh and Myanmar after entering India but skip Nagaland. I asked this question to the team of scientists who carried out the satellite tagging. But they had no answer," he said. Since November 7, Naga, a male, had taken the route of



An Amur Falcon — PHOTO: SPECIAL ARRANGEMENT

Wokha in Nagaland, Assam, Bangladesh, the Bay of Bengal, Andhra Pradesh and Karnataka before entering the straits over the Arabian Sea. During the same period, Paragi, a female, took the route of Wokha, Assam, Bangladesh, West Bengal, the Bay of

Bengal, Andhra Pradesh and Maharashtra before beginning the journey over the Arabian Sea. Wokha, also a female, followed Paragi's path and was tracked flying over the Bay of Bengal way behind the other two. The movements of all three birds are being

monitored by scientists in Hungary, filtering satellite data through a dedicated website.

Every year, from October to November, a large number of Amur falcons arrive in the northeast, especially in Nagaland for roosting, from Southeastern Siberia and northern China, en route to their final destinations — Somalia, Kenya and South Africa. Amur falcons travel up to 30,000 km a year — one of the longest distances of migration. This is the first time Amur falcons in Nagaland were satellite-tagged and their movements to South Africa are being monitored.

Joint mission

The tagging was a joint mission undertaken at Paragi village in Wokha district by two leading scientists from MMEF: Hiralal Bhangay, Power Fellowship and Seahorse Soti; Nick Williams, Programme Officer — Birds of Prey (Bumbers), Convention on Migratory Species Office Abu Dhabi, United Nations Environment Programme; R. Suresh, a scientist from the Wildlife Institute of India, and the Nagaland Forest Department. Paragi villagers helped the scientists in trapping the falcons and fitting the satellite tags.

15th November, 2013 : Every year from October to November a large number of Amur falcons arrive in the North Eastern Part of India, especially Nagaland for roosting from South eastern Siberia and Northern China. Their final destination is Somaha, Kenya and South Africa. Scientist from Birdlife Hungary along with WII has filled 3 birds with satellite tags weighing about 5 grams to study them.

Newspaper Clippings

(iii) State News

SUNDAY HINDUSTAN TIMES, LUCKNOW
OCTOBER 06, 2013

Communal amity channelled into cleaning B'khand ponds

Pankaj Jaiswal

LUCKNOW: At a time when western UP is trying to recover from last month's communal riots, the Bundelkhand region of the state is seeing Hindus and Muslims joining hands for the common good.

The two communities have made common cause to clean the region's giant ponds, full to the brim for the first time in at least 15 years following the early and prolonged monsoon this year.

Their aim is to ensure that the water they have received this season lasts them till the next monsoon. The campaign began at the Kirat Sagar, one of Mahoba's oldest and biggest ponds, at 7am on Saturday. The exercise continued till 11am.

"Never before has there been such a public movement to clean up ponds that are full of water. On the very first day we deployed 20 large boats and numerous dongs (small boats) and handheld tools to clean the ponds at the fringe and in the middle," said Pushendra of Gram Swaraj Prahari Prashikshan Sansthan.

Banda's Gram Swaraj Prahari Prashikshan Sansthan is one of

the three organisations to have planned the movement.

The other two are Mahoba's Gramonnati Sansthan and Lucknow's Matrabhoomi Sansthan.

The first stage of cleaning would go on till October 14.

"We thought we would deploy 200 people from all communities. But there were 200 Muslims alone. The total number of volunteers (of both communities) exceeded 700. Many of them are Singhars (water chestnut pluckers). They are experts at fishing plankton out of water. If we clean the ponds, the water quality will remain good for all of us," said Pushendra.

The amount of plankton removed on the very first day from Kirat Sagar was enough to fill up at least 20 trucks. There is a plan to convert all the plankton into green manure.

The campaign was supposed to begin after inauguration by district magistrate Anuj Kumar Jha, but the people were so enthusiastic that they jumped in or waded into the water of the Kirat Sagar before that.

District magistrate Anuj Kumar Jha, who was present at the inauguration, said: "Even those who go to gym, should come and do stramden here.



Hindus and Muslims cleaning Mahoba's oldest and biggest pond at Kirat Sagar in Bundelkhand.

It would help them build their homes."

Earlier this year, the district administration engaged in an elaborate exercise to clear all the channels that bring water into the ponds.

Hindus, Muslims, the young and the old, women and girls (including National Service Scheme volunteers), the illiterate and the educated, students and dropouts, and even some physically challenged persons did the work.

Apart from Kirat Sagar,

Madan Sagar, Kalyan Sagar, Vijay Sagar, Kidadi Talab and Bherapur Talab are the other prominent ponds in Mahoba. They have been meeting the water demands of the people for centuries.

At present, Mahoba gets all of its municipal water supply through these ponds, mainly from Madan Sagar.

Once successful, the campaign would be extended to other ponds in the district and then to other districts.

These ponds were earlier in

a poor condition due to scanty rainfall for over a decade, the blocking of water channels, the dumping of garbage and massive growth of plankton.

Soon after the cleaning of the ponds, people would put fish seeds to help fish spawn in the water so that these water bodies remain clean.

"In Bundelkhand people value water a lot and that is why the public movement is expected to be a kind of festival with large public participation," said Pushendra.

06th October, 2013 : Kirat Sagar is one of Mahoba's oldest and biggest ponds. The Gram Swaraj Prahari Prashikshan Sansthan of with help from all communities removed plankton in an effort to clean this water body water is an extremely valuable resource in this part of Bundelkhand.

6। दैनिक जागरण लखनऊ, 18 दिसंबर 2013

दाना-पानी दें, चहचहाएगी चिड़िया



गौरैया संरक्षण कार्यशाला

- गौरैया को बढ़ाने के लिए रामीणों ने कसी कमर
- विशेषज्ञ बोले कीट पतंगों की कमी से काम हो रही इनकी संख्या

एक कार्यक्रम में कमी के चलते गौरैया संरक्षण कार्यशाला शुरू की गई है। गौरैया को बढ़ाने के लिए रामीणों ने कसी कमर। विशेषज्ञ बोले कीट पतंगों की कमी से काम हो रही इनकी संख्या।

एक कार्यक्रम में कमी के चलते गौरैया संरक्षण कार्यशाला शुरू की गई है। गौरैया को बढ़ाने के लिए रामीणों ने कसी कमर। विशेषज्ञ बोले कीट पतंगों की कमी से काम हो रही इनकी संख्या।

गौरैया संरक्षण के लिए कार्यक्रम का आयोजन करते रामीणों का समूह। लखनऊ : हर जगह किन्ही डेस्ट्रॉय के बर्तन में दाना-पानी दे तो कुछ ही दिनों में गौरैया आपका घर में चहचहाएगी लगेगी। गौरैया के लिए कुजिम तलाब के नएत बोझ लगाए और पोषण बनाने वाले रामीणों को नुक़ाक़ रखें। यह कमी जानकारों से यह लोगों को लखनऊ विज्ञान विभाग के जंतु विज्ञान विभाग व उदात्त प्रदेस रक्षक सेवा विभाग बोर्ड ग्राह्य जालीगज के मोहन मेकन गेड के नुक़ाक़ 'गौरैया संरक्षण कार्यशाला' में। कार्यक्रम में नुक़ाक़ कच्चे व जलमयस को गौरैया संरक्षण को जानकारों से यह। जंतु विज्ञान विभाग को प्राचार्य डी अंजना कर्नोविजा ने बताया।

18th December, 2013 : A workshop was organized at Daliganj, Lucknow to spread awareness about sparrow conservation as a part of a project funded by the U.P. State Biodiversity Board.



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