ZOO'S PRINT

Communicating Science for Conservation

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Contents

Cover design by Latha G. Ravikumar, Zoo Outreach Organization, Coimbatore

I Think of All the Things I'll Miss

The cool breeze through the rustling leaves,
The cuckoo's call.
The polar bear I've never seen –
Spring changing to fall.

I miss the cheetahs.
I saw the last one in Delhi zoo
A scant few weeks before it died;
I miss orangutans, the jaguars too
As their homes are razed mile by mile.

I miss the buzzing of the bees, the wasps
who from paper make their nests.
I miss the flowers, I miss the ants, the
butterflies whose wings I pressed
in the pages of a book I read; about Nature –
I loved Her best.

To my daughter I miss pointing out
The shadow of raincloud far beyond,
Watching them race towards our roof,
Swelling, darkening, rumbling loud.

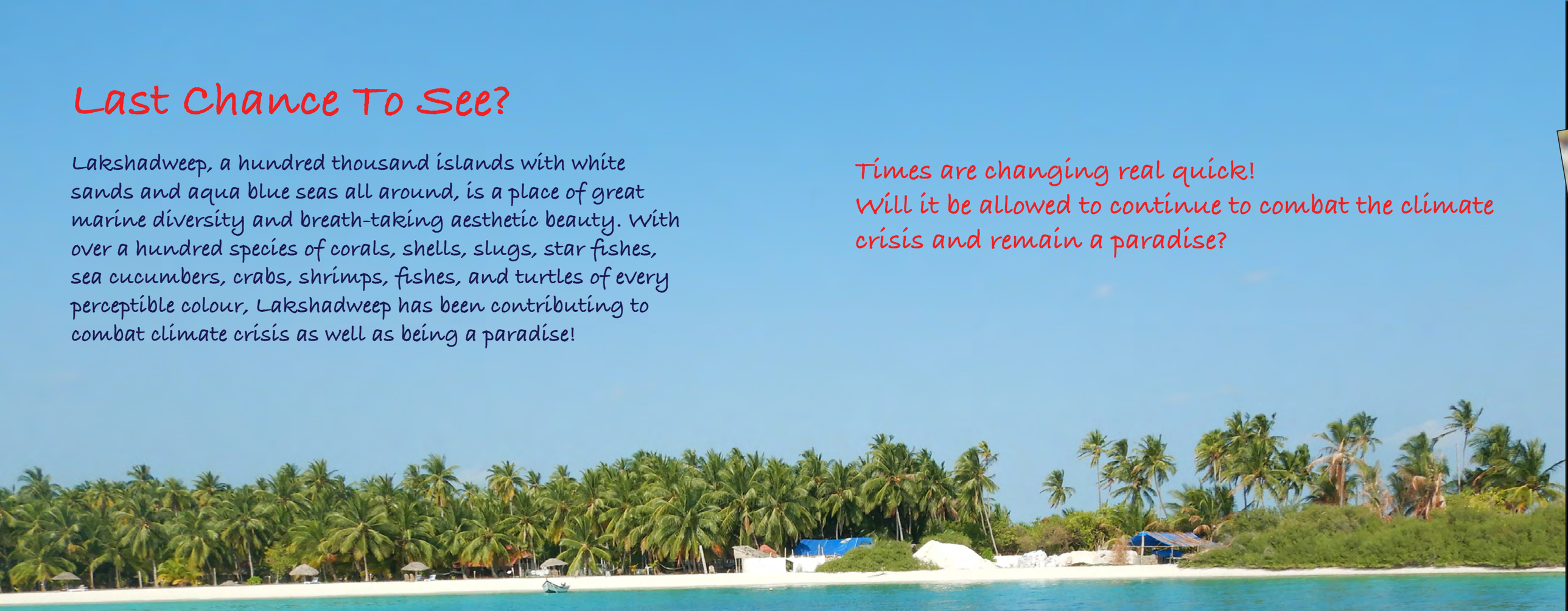
I miss water, I miss the sun
That kissed me gently on my neck
Now it burns, oh how it burns,
I miss the life I never led.

Poem & image by Nina Subramani

Last Chance To See?

Lakshadweep, a hundred thousand islands with white sands and aqua blue seas all around, is a place of great marine diversity and breath-taking aesthetic beauty. With over a hundred species of corals, shells, slugs, star fishes, sea cucumbers, crabs, shrimps, fishes, and turtles of every perceptible colour, Lakshadweep has been contributing to combat climate crisis as well as being a paradise!

Times are changing real quick!
Will it be allowed to continue to combat the climate crisis and remain a paradise?

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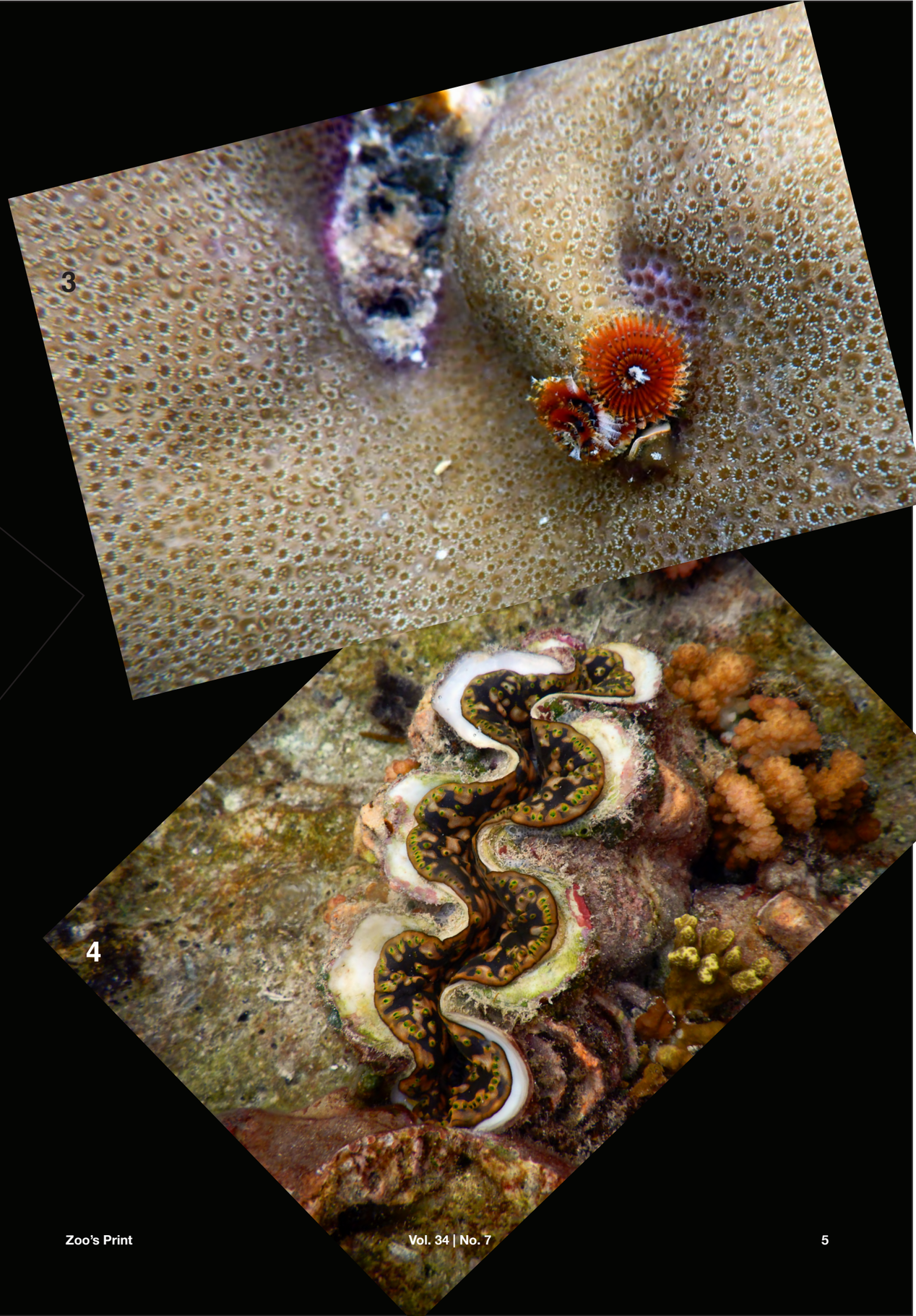
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1. Crab
2. Hard Coral
3. Christmas tree worm
4. Giant Clam
5. Hard Coral
6. Sea turtle babies
7. Hard Coral
8. Hard Coral
9. Sea Cucumber
10. Seafan
11. Hard Coral
12. Zooantharian
13. Hard Coral

Photos by
Ramvilas Ghosh

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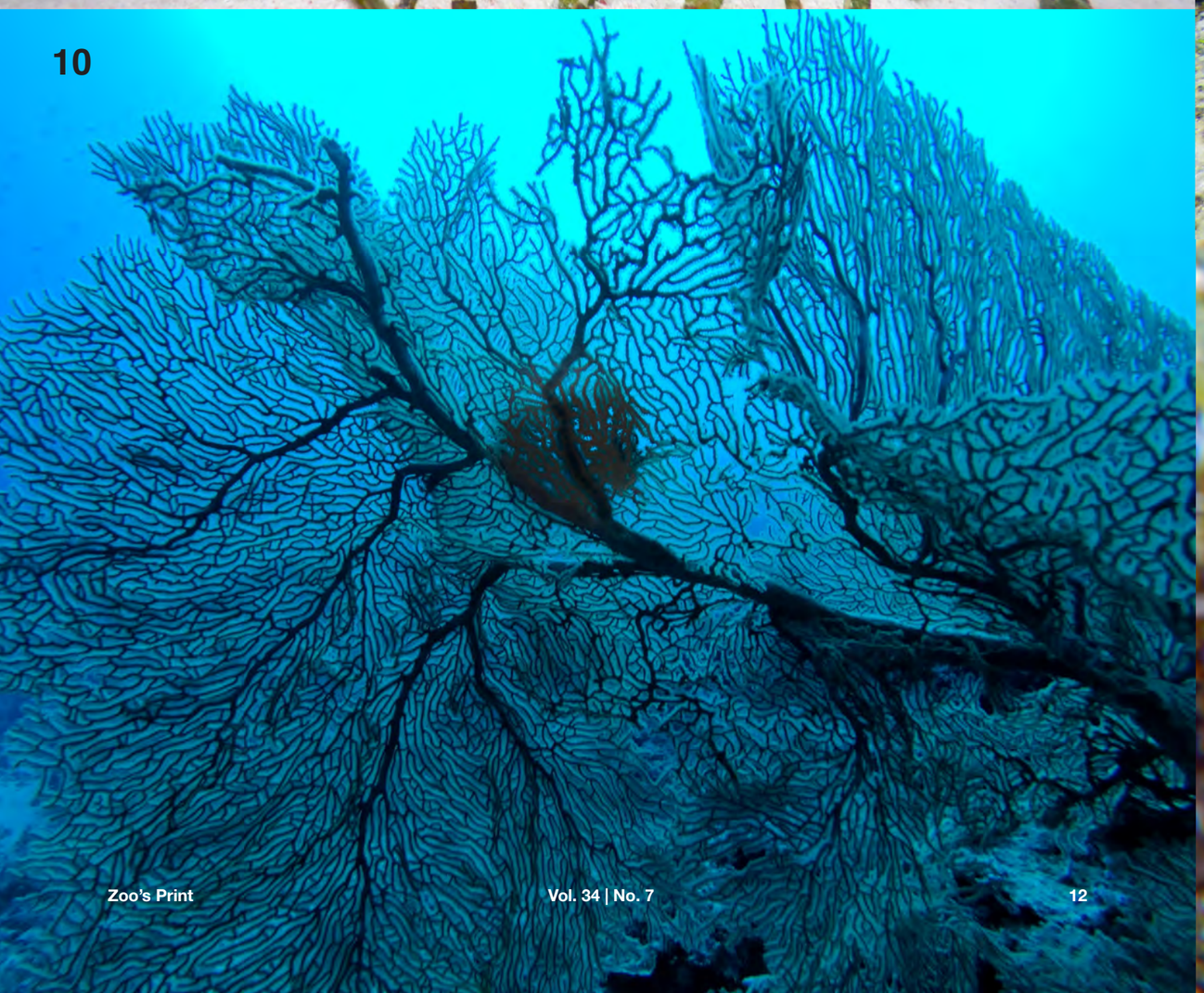

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1 WHAT IS CLIMATE CHANGE?

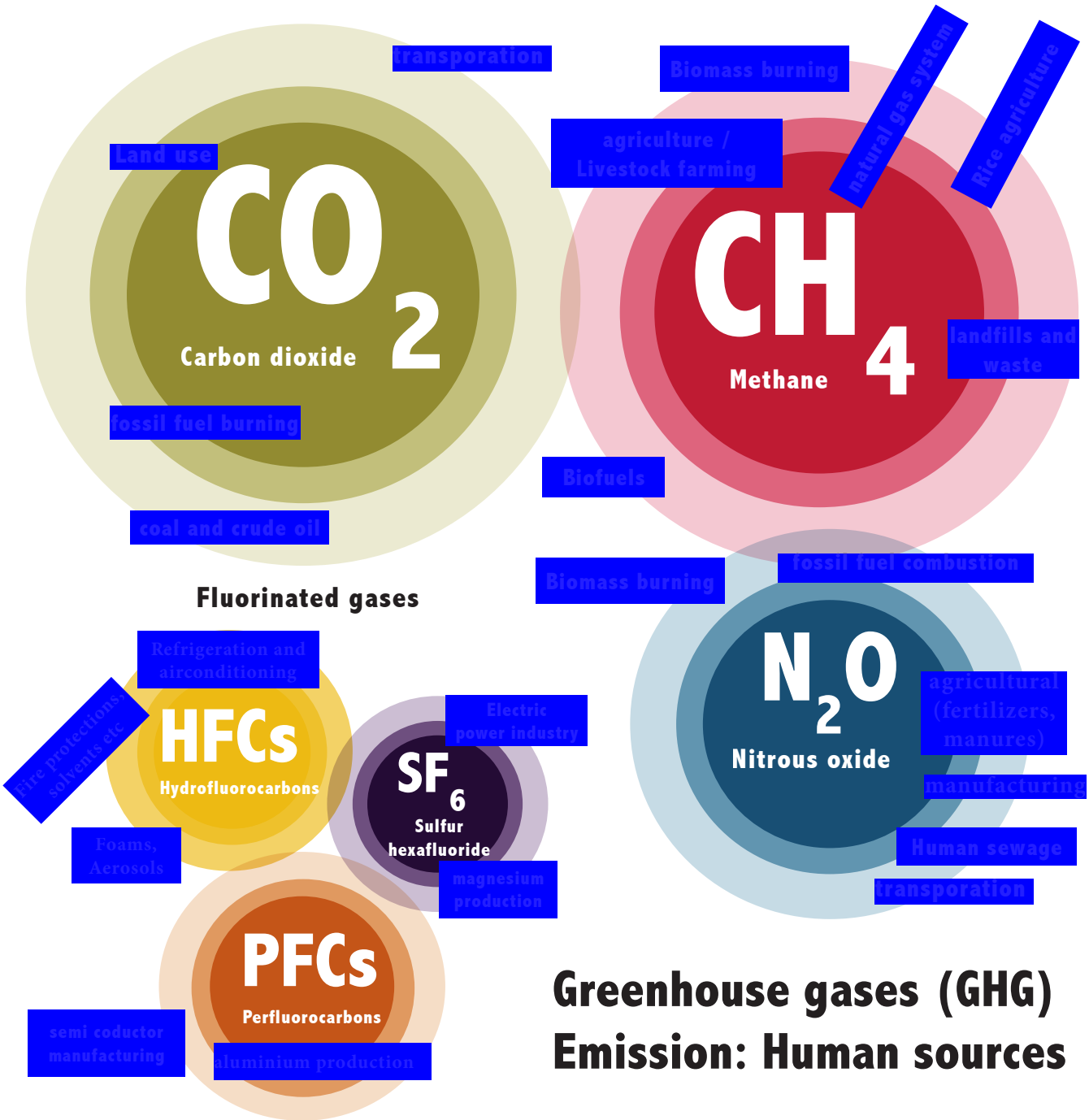
ANY CHANGE IN CLIMATE OVER TIME DUE TO NATURAL FACTORS, HUMAN ACTIVITY OR BOTH.

The Earth has warmed by an average of **1°C OVER THE LAST 100 YEARS** and is expected to **INCREASE A FURTHER 2-6°C OVER THE NEXT CENTURY**. If no action is taken, it would have the following harmful consequences to humanity and the biosphere.

- Lead to serious **WATER CRISIS.**
- **1 MILLION** Animal and Plant species at risk of extinction.
- Estimated **2.4 MILLION** premature deaths from air pollution by **2030**. In India **600 MILLION** people are at risk from its effects.
- Estimated **52 MILLION** tonnes of crop losses per year.

Greenhouse gas emission is the main cause for the climate change.

Greenhouse gases are not, inherently, a bad thing. But the growing concentration of greenhouse gases in the atmosphere has been raising average temperatures around the world. Carbon dioxide CO2, Methane CH4 and Nitrous oxide N2O are emitted to the atmosphere through natural processes as well as human activities (use of fossil fuels, industrial production, etc). The fluorinated gases on the other hand, are created and emitted almost exclusively through human activities.



Greenhouse gases (GHG) Emission: Human sources

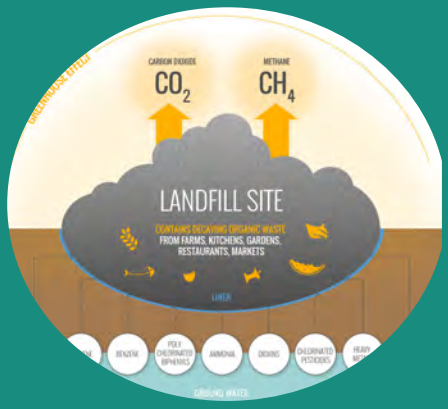
2 SOURCES OF GHG EMISSIONS

1. Burning fossil fuels - Industries have been burning large amounts of fossil fuels such as oil and gas which produces carbon dioxide.

2. Intensive Farming - Ever-increasing livestock which releases huge methane gas, plant protection production and fertilizers.

3. Deforestation - Forests absorb huge amounts of carbon dioxide from the air, and release oxygen back into it. Many forests are being cut down to make wood, palm oil and to clear the way for

farmland, roads, oil mines, and dams. When they are cut down, the carbon stored in the trees is released into the atmosphere.



4. Waste management methods like landfills and incineration emit greenhouse and toxic gases that are released into the atmosphere, soil and waterways. 1 tonne of biodegradable waste comprises approximately 50-55% methane and 40-45% carbon dioxide (CO2).

5. Metals and minerals are the raw materials used in the construction, transportation and manufacturing of goods. From extraction to delivery, this market accounts for 5% of all greenhouse gas emissions.

6. Overconsumption is responsible for the overexploitation of natural resources and emissions from international freight transport, which both contributes to global warming.

Compiled and designed by
Latha G. Ravikumar, ZOO

Crop thieves or unassuming beasts? Local opinions on wild elephants in Nilambur, Kerala

By Sanjana Addanki. Published on Jottings on 2 september 2018

Elephas maximus indicus, the Indian Elephant, India's national heritage animal, is loved by all. Or is it? Villagers living along elephant reserves face difficulties when it comes to elephants. Hungry elephants might steal their crops or accidentally wreck their property. So what do people actually think of the Indian Elephant? These opinions matter because the Indian Elephant is classified as Endangered, and people's attitudes will help us understand the best way to conserve them.

Who did they ask?

Nilambur Elephant Reserve is located in Kerala's Western Ghats, a biodiversity hotspot. The researchers randomly selected 510 people from 17 villages close to the reserve. These villagers were asked questions such as: what kind of elephant-caused issues are you facing? which is the most serious one? and, is it necessary to protect elephants and the forest?

Human-elephant interaction

Human-elephant interaction is as widespread as the various elephant species themselves.

The biggest complaint against elephants all over the world is crop damage. The villagers said that elephants preferred the crops jackfruit, plantain, coconut, and areca nut (betel nut), which has led to some farmers having to stop growing these crops.

The injury caused by elephants is very rare, as less than 5% of villagers had reported it. Many villagers, however, said it was a very serious issue.

Possibly resulting from elephant-caused injury, the most reported issue was fear of elephants and restriction of movement. Despite its prevalence, this issue was thought of as the least serious.

Although not common, a significant portion of villagers stated that they had experienced property damage caused by elephants, mainly to water pipelines, but also to water wells, fences, gates, and water tanks. In contrast to this, a separate study conducted in Nepal found that property damage was the most common issue.

Saving the elephants

Even though the relationship between elephants and humans is often fraught with problems, villagers agree that elephant conservation is a good cause. Their main reason was that the elephants have a right to live, just like we do. They also appreciated the conservation of the forest ecosystem because it significantly affects their way of life. But, the overall attitude towards elephants remained equal parts positive and negative.

Many of the villagers did not know the importance of elephants within the forest ecosystem. So, to improve conservation, we should educate everybody about how elephants carry out many key services within forest ecosystems. Learning about all the elephant does could reduce human-elephant interaction and let them thrive together for many years to come.

What are people's thoughts on Asian Elephants in the southern Western Ghats?

- Asian Elephants are listed as Endangered on the IUCN Red List.
- The study group was selected randomly among villages bordering Nilambur Elephant Reserve in Kerala.
- A total of 510 people from 17 villages were selected.
- Although many people experienced difficulties caused by elephants, the general attitude was one of conservation.
- The biggest issue in not only India but also in other areas where elephants are common is damage to crops.
- In India, elephants favour crops such as jackfruit, plantain, coconut, and areca nut (betel nut).

- Despite elephant-caused injuries being rare, it was one of the largest issues between villagers and elephants.
- Many villagers reported that their fear of elephants greatly restricted their freedom, but they said this wasn't a serious issue.
- Although occurrences of property damaged by elephants is a significant problem, villagers did not think it was the most important.
- Even though the relationship between humans and elephants is fraught with problems, villagers think that elephant conservation is a good and important cause
- This is mostly because the villagers value the elephants' right to live and they know that the forest ecosystem is very important for their way of life.
- The villagers' attitudes toward elephants were equally positive and negative — this could change after a sudden elephant attack.
- In order to be able to protect the already threatened elephants, we need to educate the villagers about the importance of elephants within forest ecosystems.
- This could reduce negative interactions and help elephants and people to thrive together.

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This science communication was originally published in Jottings at https://threatenedtaxa.org/jottings/behaviour/crop-thieves-or-unassuming-beasts-local-opinions-on-wild-elephants-in-nilambur-kerala/.

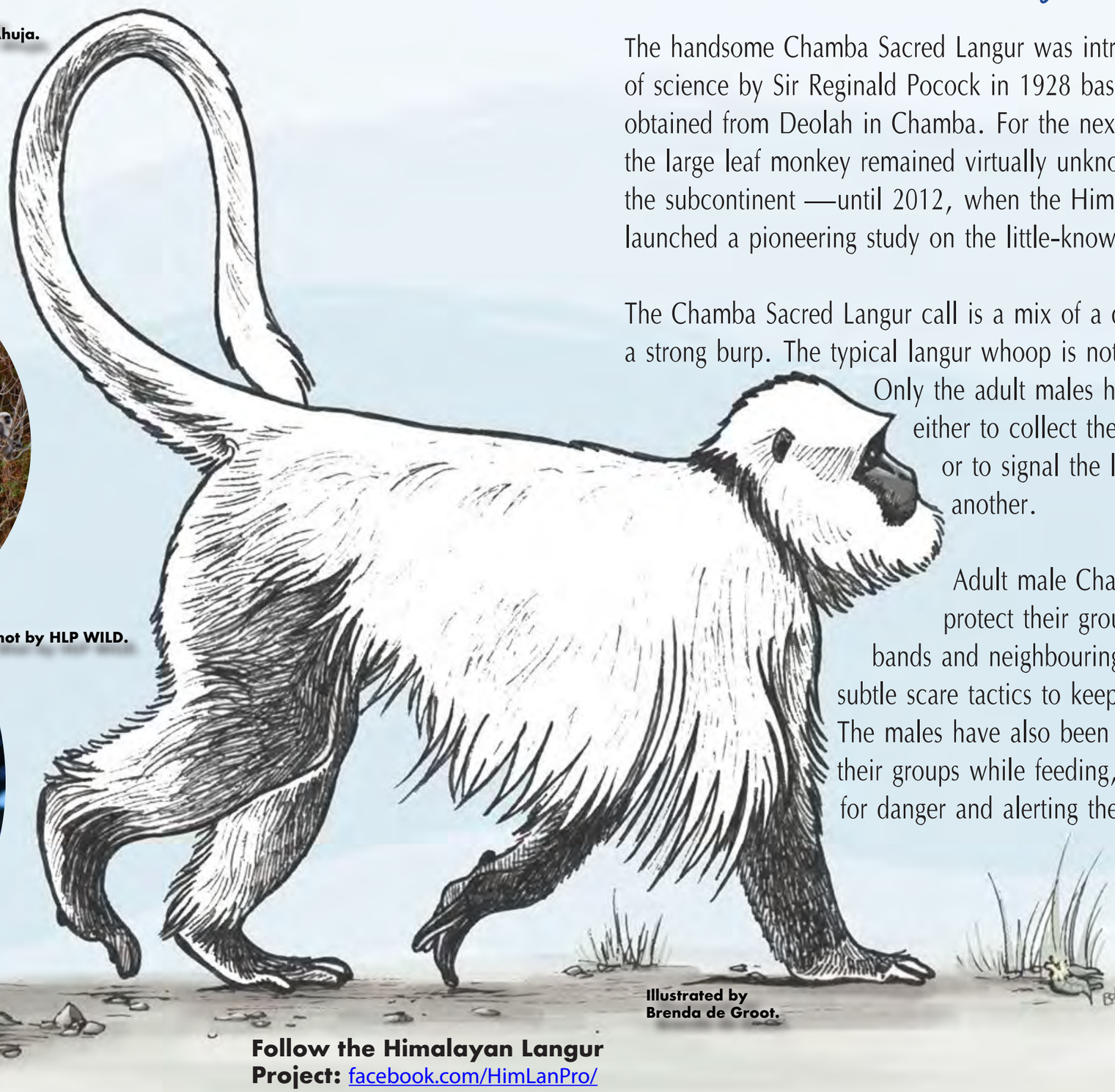
About the author:
Sanjana Addanki is a 14-year-old intern who loves to learn about ecology and biodiversity while educating the public about the natural world.

You too can jot for the cause of conservation! Find out how at https://threatenedtaxa.org/jottings/contribute/

Himalayan Langur Project

Shot by Vishal Ahuja.

Shot by HLP WILD.



Illustrated by Brenda de Groot.

The handsome Chamba Sacred Langur was introduced to the world of science by Sir Reginald Pocock in 1928 based on a skin specimen obtained from Deolah in Chamba. For the next 80 years, however, the large leaf monkey remained virtually unknown to primatologists in the subcontinent —until 2012, when the Himalayan Langur Project launched a pioneering study on the little-known Himalayan species.

The Chamba Sacred Langur call is a mix of a deep grunt followed by a strong burp. The typical langur whoop is not heard in the species. Only the adult males have been observed to call, either to collect the group before a movement or to signal the location of one male to another.

Adult male Chamba Sacred Langurs protect their groups from vagrant bachelor bands and neighbouring groups and engage in subtle scare tactics to keep the miscreants at bay. The males have also been observed to look out for their groups while feeding, scouring the feeding area for danger and alerting the members.

Text by Vidya Mary George, ZOO.

Follow the Himalayan Langur Project: facebook.com/HimLanPro/

Instagram

INSTAGRAM IMAGES

Since its original description in 1883 by Boulenger, the dainty little Small Tree Frog was lost to science for over a century until its rediscovery from Coorg in India in 1998. The slender hopper is known not only for its quick costume change act—it can change its bright green overalls into bright brown in a matter of seconds—but also for its unique and novel nesting behaviour—it deposits its eggs in gel and packs them into a purse made out of a single leaf hanging above water. Shot at Coorg by S. Molur, ZOO; posted on 01 Jul 2019.

The geometric elegance of beehives has gotten us buzzing since time immemorial. The high-precision engineers of these architectural marvels are also the world's most prolific pollinators. Be it social skills, cooperation, or hard work, there's indeed much to learn from the busy bees! Shot at Coimbatore by B. Ravichandran, ZOO; posted on 28 Jun 2019.

During winter, when food resources become scarce, the Hairy Bergenia blooms in dense clusters of white, pink, or purple flowers, nourishing a diverse group of pollinating insects in the Himalaya. The perennial herb grows in rocky and stony habitats and is well-recognized for its use in traditional medicine for the treatment of kidney stones, earning it its local name that means 'the breaker of stones' (पत्थर तोड़). Shot at Chamba by V. Ahuja, ZOO; posted on 24 Jun 2019.

With its heavily spotted grey-brown plumage, it is easy to see where the Spotted Owlet gets its name from. Adapted to a wide range of habitats—even human settlements, this small and stocky bird of prey roosts in small groups in holes, hollows, and crevices in rocks, trees, and buildings, and emerges at night to control the pests in its neighbourhood! Shot at Coimbatore by B. Ravichandran, ZOO; posted on 20 Jun 2019.

We bring to you every week shots and tidbits of incredibly diverse species from around the natural world! Follow us on Instagram to be part of a growing community that celebrates our natural heritage: https://www.instagram.com/threatenedtaxa/
Follow B. Ravichandran on Instagram: https://www.instagram.com/discoverravi/
Follow S. Molur on Instagram: https://www.instagram.com/molursanjay/
Follow V. Ahuja: https://www.instagram.com/p.vishalahuja
Captions by Vidya Mary George, ZOO.

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Alien in my garden: a new record of an exotic *Laevicaulis* slug species in northern India

Laevicaulis haroldi. **Photo credit: Adil Khan**

Introduction

Snails and slugs are found to inhabit a vast variety of habitats (Solem 2019), from marine to terrestrial. Their physio-morphological adaptations allow them to adjust to micro-climatic refuges like fallen logs, rock crevices, and leaf litter (Dundee 1980; Govender 2007; Magare 2015). *Laevicaulis haroldi* (Dundee, 1980) (Gastropoda: Stylommatophora: Veronicellidae) is a terrestrial slug species that is native to KwaZulu-Natal in south-eastern South Africa (Dundee 1980; Govender 2007; Herbert 1997; MolluscaBase 2018) and is an Endangered species (Herbert 2013). It was discovered by Harold A. Dundee in 1977 in a marshy lot in Durban City, South Africa. In the subsequent years, it was identified by D.S. Dundee in his article about the species in 1980. In India, *L. haroldi* was first observed and indentified in three districts of Maharashtra in western India (Magare 2015).

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Photos of *Laevicaulis haroldi* slug. A - contracted slug in comparison to a coin, B and C - free moving slug, D - underside of the slug showing sole. Photo credit: Adil Khan

A single specimen of the species was found attached to the underside of a bird feeder in the author's garden (28.567N & 77.357E) at midday of 27 September 2018 with temperature 37^{0}C. It was collected using a pair of clean forceps and placed in a glass jar for the purpose of documentation, including external measurement and morphology. The individual was photographed using the camera Canon Powershot SX50 HS. The images were posted on iNaturalist for identification and were identified as *Laevicaulis haroldi* by experts. The slug was released after documentation.

Results and Discussion

The specimen collected was a single individual bearing some similarity to *Laevicaulis alte* (a common slug), though very different morphologically. Unlike *L. alte*, the specimen's dorsal body was wheatish-brown in colour with irregular white bands spread across laterally giving a wrinkly appearance, while both ends had an aggregation of black patches.

The slug was initially found to be in an inactive state. Interestingly, the slug lost its wrinkly appearance when it was fully

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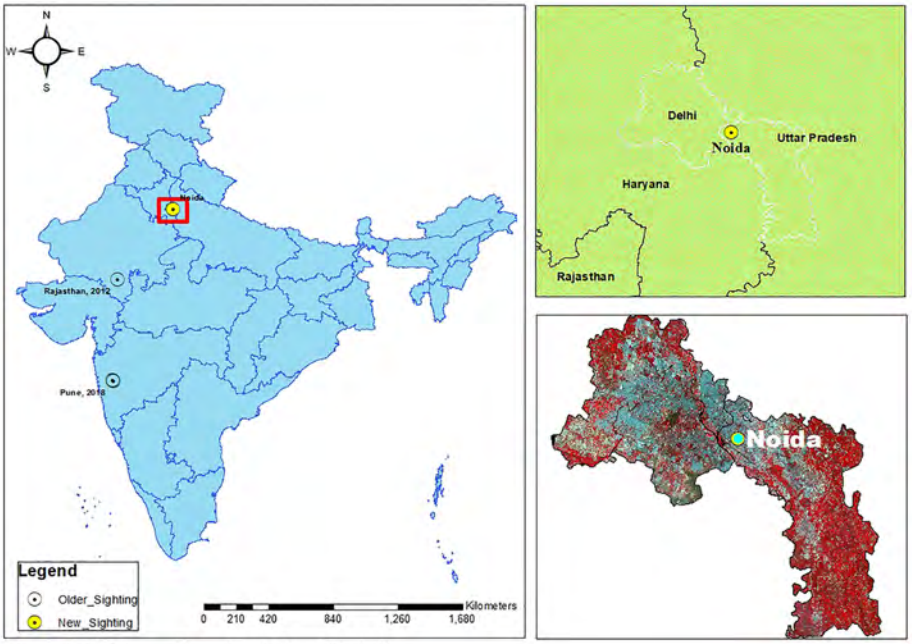

Sightings of *Laevicaulis haroldi* in India

hydrated. The anterior end possesses two sets of tentacles. The sole is translucent and covers nearly the entire length of the slug's ventral body. The specimen was measured and the total length was found to be 48mm and the width to be 10mm.

Previous sightings of the same species were recorded in the states of Rajasthan and Maharashtra in India (iNaturalist n.d.; Project Noah n.d.).

Additionally, slugs were also recorded from the base of the Satpuda Mountains in Maharashtra (Magare 2015). The presence of exotic slugs in India can possibly be attributed to the introduction of flowering plants from different countries (Raheem et al. 2014).

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For communication, Email: daniel@zooreach.org

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First record of the rare Anomalous Nawab *Polyura* (=*Charaxes*) *agrarius* (Swinhoe, 1887) (Lepidoptera: Nymphalidae: Charaxinae) from Purulia, West Bengal, India

Anomalous Nawab showing the identifying character of two small pale yellow dots in the sub-apical region of the forewing. © Supriya Samanta.

The butterfly Anomalous Nawab *Polyura agrarius* (Swinhoe, 1887) has a localized distribution in India with records from southern to central (including Gujarat and Rajasthan), northern (Uttarakhand, Punjab, and Himachal Pradesh), and north eastern parts of the country (Kehimkar 2016; Mehra et al. 2017; Smetacek 2017). This species is considered as uncommon or rare due its specialized habitat, patchy distribution and low population density (Kehimkar 2016; Smetacek 2017) though its status has not yet been evaluated by the International Union for Conservation of Nature and Natural Resources (IUCN). The present study reports a new distribution record for this species from Purulia in West Bengal, eastern India, which expands its distribution range in the country.

Butterflies commonly known as Nawabs are included in the genus *Polyura*. They

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belong to the brush-footed butterflies of the subfamily Charaxinae under the family Nymphalidae. Distribution of *Polyura*, which contains 26 species (Smile 1982), is restricted to the Indo-Malayan and Australasian ecozones (Toussaint et al. 2015).

The taxonomic status of *Polyura agrarius* has been a matter of argument among lepidopterists. The species was first reported by Swinhoe (1887) from Mhow and Assirghur in Madhya Pradesh, India. Swinhoe (1887) placed this species under the genus *Charaxes*. Its species status was questioned by several lepidopterists such as Rothschild & Jordan (1899), Bingham (1905), Evans (1932), and Wynter-Blyth (1957). They preferred to treat *P. agrarius* as a subspecies of *P. bharata* Felder, 1867 (then *P. athamas* Drury, 1773). The taxonomic puzzle continued for more than a century until recent molecular studies by Toussaint et al. (2015) confirmed the species status of *P. agrarius*.

***Helictres isora* (Linneaus), the tree on which Anomalous Nawab was perching at the time of observation. © Supriya Samanta.**

During a recent field study on 06 December 2017, one specimen of *P. agrarius* was recorded from Joychandi Pahar situated in the Purulia District of West Bengal, India. The butterfly was photographed using Canon EOS 750D with Canon 55–250 mm lens at 12.08h. The butterfly was perching on a leaf of a *Helictres isora* (Linneaus) tree. The specimen was not collected. It was identified on the basis of two small pale yellow dots present in the sub-apical region of the forewing. The image was uploaded in the Butterflies of India website with media code cr233 (Lovalekar et al. 2018).

Joychandi Pahar in Purulia is located at 23.55^{0}N & 86.67^{0}E. It has an average elevation of 155m. The area forms the

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Distribution of Anomalous Nawab in the Indian subcontinent including the present report from Joychandi Pahar in Purulia, West Bengal (green circle). (Captured on 07.11.2018 from the Butterflies of India website; Lovalekar et al. 2018).

lowest step of the Chota Nagpur Plateau. The published records of the butterfly diversity of Purulia District in recent times by Samanta et al. 2017 and Das 2018 documented 54 and 71 species respectively including Common Nawab (*P. athamas* Drury, 1773), the closest relative of *P. agrarius*.

The present observation is the first record of *P. agrarius* from West Bengal as well as from the eastern part of India. As this is a single observation record, more intensive field surveys are necessary to find out the population status of the species in this part of India. *Polyura agrarius* is known to be sympatric with *P. athamas* and prefers similar habitats (Mehra et al. 2017). During the present observation, three specimens of *P. athamas* were found to be perching on the same tree with *P. agrarius*. As suggested by Mehra et al. (2017), competition for available resources between these two sympatric species might be limiting the population size of *P. agrarius*.

Incorporating the present observation the updated distribution range of the *P. agrarius* is from southern to central India (including Gujarat, Rajasthan), northern India (Uttarakhand, Punjab and Himachal Pradesh), northeastern India and Eastern India (West Bengal).

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Occurrence of Dark Sapphire *Heliophorus indicus* Fruhstorfer, 1908 (Lepidoptera: Lycaenidae) in Garhwal Himalaya, Uttarakhand, India

Male (30mm) specimen of *Heliophorus indicus* collected at Siroli Village (~1,645m), Chamoli District, Uttarakhand, India: a—Underside of live specimen | b—Upperside of live specimen| c—Underside of stretched specimen | d—Upperside of stretched specimen. © Arun Pratap Singh.

The Dark Sapphire or Indian Purple Sapphire *Heliophorus indicus* (syn. *H. epicles indicus* Fruh.) has a distribution range from Kumaon in Uttarakhand through Nepal, Sikkim, Bhutan, and the northeastern Indian states up to Myanmar (Evans 1932; Wynter-Blyth 1957; Gasse 2013; Kehimkar 2014, 2016; Varshney & Smetacek 2015; Anonymous 2019) in an elevation of 600–2,100 m. The male of this species is characterized by sharp forewing apex, straight termen, dark shining purple upper side, and no discal markings on the underside or markings that are reduced to a few dots between the base and the red marginal area (Evans 1932; Wynter-Blyth 1957).

The present study reports for the first time the presence of the species along the boundary of Kedarnath Musk Deer Sanctuary in Chamoli District in the Garhwal region of Uttarakhand, 200km eastwards of Nepal. Three individuals (1 male and 2 females) were spotted during the survey. A male was photographed and collected from Siroli Village (30.469^{0}N & 79.290^{0}E; ~1,645m) at 11.00h on 25 October 2017. The site is located along the river Atri, on the way to

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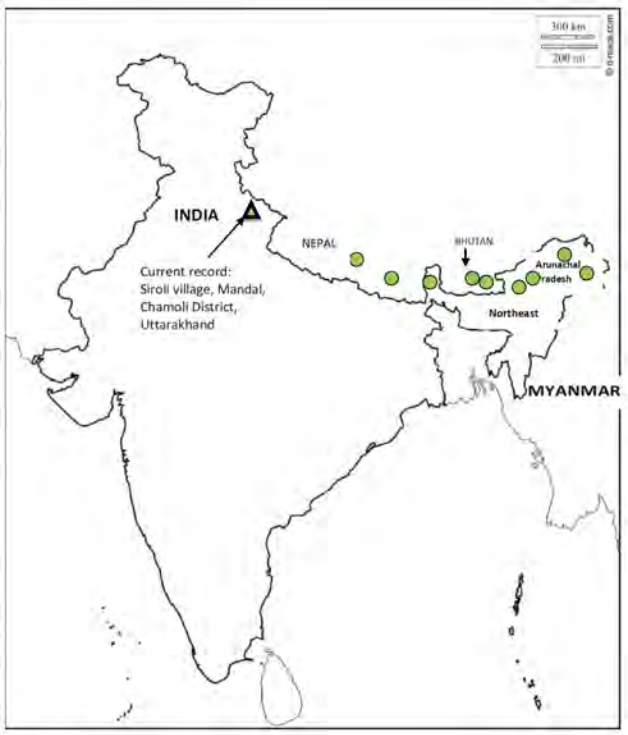

The location of the present record of *Heliophorus indicus* in Garhwal, Uttarakhand (western Himalaya), in relation to the past confirmed records of the species across other areas of the central and eastern Himalaya.

Anusuyia Devi Temple from Mandal Village, 13km from Gopeshwar towards Chopta. Two individuals, a male and a female, were again spotted at the site of previous sighting around 09.15h on 23 June 2018. The site bears a dense growth of *Polygonum* sp., the butterfly's larval food plant, along the foot trail through the village. The species, though widely distributed across the Himalaya, has so far been reported up to Kumaon region (Evans 1932) with no recent records from Uttarakhand (Singh & Sondhi 2016). These sightings therefore confirm the range extension of *Heliophorus indicus* further westwards, towards Garhwal in Uttarakhand.

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Occurrence of the Northern Red Muntjac *Muntiacus vaginalis* (Cetartiodactyla: Cervidae) in an ecotone in northeastern Nepal

The Northern Red Muntjac *Muntiacus vaginalis* in northeastern Nepal. © Nishikant Gupta.

An ecotone can be defined as an ecosystem where two communities (for e.g., agricultural land and forest) integrate. Such environments are significant for adaptive species that can benefit from the availability of multiple habitats. A pair of Northern Red Muntjac *Muntiacus vaginalis* (Boddaert, 1785) was spotted in an ecotone landscape in northeastern Nepal.

The Northern Red Muntjac has a chestnut red-coloured coat, dark brownish-black facial markings, and small antlers (Timmins et al. 2016). It is protected under Nepal's National Parks and Wildlife Conservation Act 2029 (1973) (Jnawali et al. 2011). The species occurs in dense tropical and subtropical forests, thickly wooded hills, and also in degraded forest areas near human settlements (Paudel et al. 2015).

Although the Northern Red Muntjac is globally assessed as Least Concern (Timmins et al. 2016), it is assessed as Vulnerable in Nepal due to a decline in its populations in the wild over the past 15 years (>10,000 individuals remaining; Jnawali et al. 2011). Anthropogenic stressors such as habitat encroachment and conversion of forest into agricultural lands (Amin et al. 2018) and the

The study area in northeastern Nepal

changing climatic variables (Alfthan et al. 2008) have the potential to adversely impact the species.

The study area in Nepal (27.618N & 85.453E) is a forested area with agricultural land managed by local ethnic groups. During a biodiversity survey undertaken by the author in June 2018, a pair of Northern Red Muntjacs was sighted in the ecotone (between the agricultural and forested land) at around 06.30h. The pair was observed for 5 minutes using binoculars (10 x 50 DPS) and was photographed. During the observation period, the pair continued to forage in the ecotone while maintaining close proximity to each other. An alarm call was raised by one of the members of the pair on spotting the author, and the pair then disappeared into the thick forest behind them.

Currently, there are no known targeted conservation measures in place to protect the Northern Red Muntjac in the study site. The presence of this vulnerable species is a promising sign for species conservation and highlights the availability of additional habitat. With the growing anthropogenic and climatic threats to forest ecosystems, however, future conservation strategies need to address the threats and habitat requirements of the species for its long-term conservation.

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World Environment Day celebration at TATA Zoo, Jamshedpur

World Environment Day is the biggest annual event for positive environmental action which takes place on 5 June every year and this year's theme was "Air Pollution". Air pollution is one such form that refers to the contamination of the air, irrespective of indoor or outside.

Environment Awareness Bicycle Rally on the theme Air pollution

The WED day was celebrated on 4-5th June in association with NTTF Burma Mines and JUSCO School Kadma respectively. To achieve this target, we organized an "Environment Awareness Bicycle Rally" on 4th June about air pollution by promoting cycling instead of extensive use of automobiles. The "Bicycle Rally" was flagged off by Amresh Sinha, Sr. Manager, Corporate Communication, Tata Steel Ltd & Member, Tata Steel Zoological Society at zoo main gate and it was concluded at the Nature Education Centre. A total of 54 cyclists participated in the rally.

Eco-friendly Painting workshop on tribal art like Petkar and Soharai arts of Jharkhand state

On 5 June, an "Eco-friendly Painting Workshop" was organized on tribal art like Petkar and Soharai arts of Jharkhand state for the school children to promote the use of natural colours and to minimize the environmental pollution due to harmful chemicals used in synthetic paints. JUSCO School Kadma joined us in the cause. A total of 78 children participated in the occasion and succeeded in making the message of the day relevant and come to life with their beautiful paintings. Pratap Gill, Zoo Staff and Shobhit Mahato, Zoo Volunteer handled the proceedings of the event on behalf of the zoo.

Submitted by Seema Rani, Biologist cum Education Officer, Tata Steel Zoological Park, Jamshedpur. Email: cmarani00@rediffmail.com

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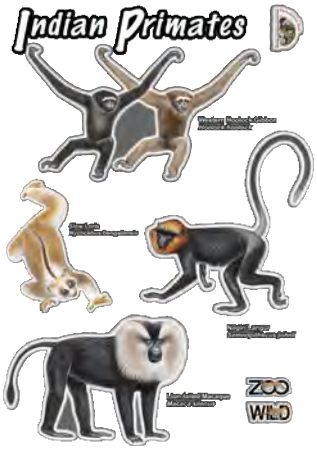

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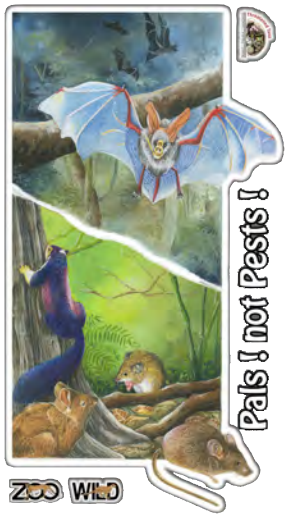

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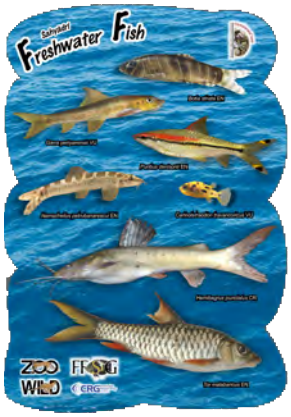

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