

Record of the *Varanus Flavescens* from Uttarakhand

VARANUS *flavescens* is the threatened and elusive monitor lizard (largest Saurian in the world) present in India. This species is endemic to South and Southeast Asia. As per the literature available, it has been reported from the Indus, Ganges, and Brahmaputra rivers. Studies also indicate it is present in the States of Punjab, Haryana, Himachal Pradesh, Uttar Pradesh, Bihar, Assam, Odisha, West Bengal, and Jammu and Kashmir. As far as the Uttarakhand State is concerned, any authenticated information on the distribution of *V. flavescens* is unavailable. This species is protected under the Wildlife (Protection) Act 1972.

Our study documents the record of *Varanus flavescens* from Uttarakhand, North India, with photographic evidence. We have published this study in the *National Academy Science Letters*. The specimen was recorded from the Laksar-Aithal motor road, near Bukkanpur village in the Haridwar district of Uttarakhand State. The specimen was recorded adjacent to the Pathri forest reserve (~1.2 km) and the Banganga river (~8.5 km). The area is dominated by agricultural fields where people grow wheat, rice, sugarcane and maize as cash crops.

Hardwicke and Gray, in 1827, described the species. Factors like habitat destruction and illegal poaching make the species threatened across its geographical range in South



Dorsal view of the living specimen of *Varanus flavescens* recorded from the Khadar plains near Aithal area, Uttarakhand

Asia. In India, cases of illegal trade/poaching have been reported due to the demand of skin, meat, and to counter diseases, as the species has been known to have aphrodisiac properties. Considering that records for the presence of *V. flavescens* in Uttarakhand State were previously unconfirmed, our report provides the first record of the species in this region of northern India.

We also recommend that a baseline study be initiated on this site, as it constitutes an important repository of herpeto-fauna, to strengthen further the data on geographical distribution and status of the species. As an effective conservation strategy, monitoring its habitat and community participation in such a conservation initiative would help be a prerequisite.

Contributed by Abhishek K Singh, Endangered Flora and Fauna on Earth Conservation Team, Dehradun-248006, Uttarakhand. Vaibhav K Singh, Office of the Divisional Forest Officer, Rudrapur Forest Division, Rudrapur-246171, Uttarakhand.

Ritesh Joshi and Kanchan Puri are from the Ministry of Environment, Forest & Climate Change, New Delhi-110 003.

Email: backupmoef@gmail.com

Climate Change will Affect Fire Weather Danger in Indian Forests

HUMAN activity is causing the earth's climate to change in unprecedented ways. Atmospheric temperatures are rising rapidly and will continue to rise in the future. These warming temperatures will increase the fire weather danger in many Indian forests, according to a recent study by IIT Delhi.

IIT Delhi researchers developed a very high-resolution data set of future climate projections and used that data to calculate the Fire Weather Index (FWI) for forest regions of India. The results showed that forests in Central and South India and the Himalayan region will see significant increases in FWI by the end of the century. The fire season in these regions will also increase by 12-61 days.

These findings align well with the conventional wisdom that higher temperatures increase forest fire hazards. Interestingly, the study showed that not to be the case in all forests. Humid tropical forests in the Western Ghats and parts of the Northeast, where rainfall and humidity are projected to rise, will experience lower FWI despite the warming.

Dr Somnath Baidya Roy, Professor and Head of the Centre for Atmospheric Sciences and a co-author of the study, said, "We must study forest fires in India at a high degree of granularity to properly represent the diversity in climate and forest types across the country. Course resolution global scale studies simply don't work for us."

Anasuya Barik, PhD student at the Centre for Atmospheric Sciences and the study's lead author, said, "Our study is the first of its kind in India and has significant implications for understanding and managing forest fires. Our study shows that we need to develop fire danger thresholds and management policies at local levels instead of national levels."

The study was published in *Communications Earth and Environment*.

Source: IIT Delhi Press Release

Logging and Climate Change Threaten Montane Birds

RESearchers at the Indian Institute of Science (IISc), Bengaluru, have studied the effects of forest logging and climate change on bird communities in tropical mountains by examining over ten years of data. In a study published in *Global Ecology and Conservation*, the team used mist netting and bird ringing data to answer how the composition of the mid-elevation Eastern Himalayan understorey bird community changed in primary (undisturbed) forests as well as in logged forests.

Tropical montane forests are unique ecosystems that can start at about 150-200 m and reach up to 3,500 m high up on mountains around the world. They are critical centres of biodiversity. “In tropical mountains, each species has a particular niche where it is found. This restriction creates much more diversity in a small space,” explains Ritobroto Chanda, former Project Associate at the Centre for Ecological Sciences (CES), IISc, and corresponding author of the study.

Forest loss and climate change present major threats to these ecosystems. “Birds — and indeed much of the flora and fauna — of tropical mountain ranges are extremely temperature-sensitive and are responding to global heating rapidly. Also, most of the world’s terrestrial biodiversity is concentrated in tropical mountains,” says Umesh Srinivasan, Assistant Professor at CES and another author. However, very few studies have explored the joint influence of these threats.

The team found that many bird species have started shifting to higher elevations due to rising temperatures. Logged forests have higher average temperatures and lower humidity than primary forests, thus hastening the transition. Additionally, birds that are smaller in size seem to colonise



Image Credit: Global Change Lab, CES

A Chestnut-headed Tesia being ringed



Image credit: Mithoh Rai

A Yellow-throated fulvetta with metal and colour rings

these logged forests better because they can tolerate higher temperatures, while the density of larger bird species appears to be increasing in the primary forests.

The team collected data from the Eaglenest Wildlife Sanctuary, Arunachal Pradesh, situated in the biodiversity hotspot of Eastern Himalayas and home to over 500 bird species. The area saw intensive logging until 2002, and the logged regions have major differences compared to intact forests, making them ideal for the study. The support of the local communities is also critical to carry out such studies, Chanda says. “You have to stay in a wildlife sanctuary with no paved roads, no electricity, and no place to stay as such. We take our food with us, cook on a daily basis, make a makeshift camp and move around, and without the people’s support, it’s really not possible to continue this for a long time,” he emphasises.

After setting up the mist nets each day, the team checked them every 20-30 minutes, weighed and labelled the birds, and released them immediately. Out of the 6,189 captured individuals from 130 species, the final analysis included 4,801 understorey insectivores — insect-eating birds that live under the canopy of large trees — belonging to about 61 species. The researchers focused on these birds because their niches are well-defined, and abundant data from the mist nets is available. Rare species were left out of the study to avoid skewed results.

The team found that logging can lead to the loss of large-bodied, old, growth-dependent species and decrease the overall biodiversity. Understorey insectivores, which are often found only in specific niches, are negatively influenced by logging and show steep declines in numbers. Logged forests also have lower densities of foliage-dwelling insects, reducing the resource availability for the birds. Since large species have higher energy requirements, this disproportionately reduces the abundance of large species.

The study highlights the need to safeguard primary forests to mitigate the effects of climate change. “Logging managers should ensure that undisturbed forests across large elevational gradients are protected,” says Srinivasan. He explains that this will allow species to shift their ranges upwards in response to climate change and maintain survival. “If species encounter degraded forest while they shift upwards, certain species will most likely go locally extinct.”

Source: IISc Press Release

Carnivorous plant traps help scientists explain the evolution of complex 'composite' traits

AN international team of researchers led by Dr Ulrike Bauer from the University of Bristol investigated two tropical pitcher plant species growing separated by 4000 km of the open ocean: the Slender Pitcher Plant (*Nepenthes gracilis*) found in Borneo and *Nepenthes pervillei* from the Seychelles islands off the East coast of Africa.

Dr Bauer and her team found that both plants had independently evolved the same unusual 'springboard' mechanism to capture insects. When falling raindrops hit the roof-like trap lid of the pitcher plant, insects standing on the underside of the trap lid are catapulted into the trap below.

This springboard trapping mechanism only works if three independent traits come together. First, the lid needs to be horizontal so that the catapulted prey lands inside the trap. Second, the lid needs to act as a spring so that the impact energy of the raindrop is transferred to the insect. Finally, the underside of the lid is covered with a layer of fine wax crystals that give it just the right level of slipperiness — grippy enough for insects to walk upside down under the still lid but slippery enough for them to lose grip when a drop hits. All three components are necessary for the trap to work. Springboard trapping is what Dr Bauer calls a 'composite trait'.

Evolutionary biologists struggle to explain the emergence of such composite traits. "We learn in school that evolution works by natural selection acting on naturally variable traits," Dr Bauer explains. Individuals with advantageous



Image credit: Ulrike Bauer

A large *Polyrhachis pruinosa* ant feeds on sweet nectar secretions on the underside of an *N. gracilis* pitcher lid

traits have more offspring; thus, over time, the frequency of genes underlying the advantageous traits increases in the population."

"This simple concept explains how giraffe necks got longer, and cheetahs got faster over time, but it struggles to explain the emergence of entirely novel traits, especially where these originate from a combination of multiple, previously unrelated components, such as the pitcher plant's springboard mechanism."

Dr Bauer and her team developed an alternative hypothesis for composite trait evolution: spontaneous coincidence, or in other words, a chance encounter of a new beneficial combination.

"Our research showed that in the majority of *Nepenthes* pitcher plant species, the three component traits of the springboard trapping mechanism are unusually variable," Dr Bauer said.

"This increased the pool of possible trait combinations and therefore, the likelihood of a beneficial new combination. In this case it is actually the absence of strong selection that facilitates evolution, as it allows the traits to be more variable, in turn increasing the number of 'tickets' in the evolutionary lottery."

Source: University of Bristol Press Release

For most Animals Sperm Quality does not Reduce with Age

IN humans, male fertility and sperm fitness decline with age, but scientists have made the surprising discovery that this pattern is not consistent in other animals. The findings have been published in the journal *Nature Communications*.

The team, led by the University of Oxford, assessed the results of 379 studies which covered a wide range of animals, including mammals, insects, birds, and fish. This found that, overall, advancing age seemed to have no impact on ejaculate size, number of sperm, sperm motility, or sperm viability.

For some animals, age even had a positive effect on reproductive traits. In many insect species, for example, ejaculate size, quantity of sperm, and sperm viability all improve with age. However, it is possible that this result may be explained by methodological limitations in the studies. For instance, in many insect studies, males were kept as virgins until old age, during which they are likely to accumulate sperm.

From all animals examined, only lab rodents showed age-related deterioration in most ejaculate traits measured. Dr Regina Vega-Trejo (Department of Biology, University of Oxford), co-lead author of the study, said: "The lack of consistency across animals in the impact

Human activity facilitates invasive plants' colonisation in Mediterranean ecosystems

THIS is the case of the invasive plants that are common in the Mediterranean habitats, according to an article published in the journal *Trends in Plant Science*, signed by Professor Sergi Munné-Bosch, from the Faculty of Biology, the Biodiversity Research Institute (IRBio) and the Institute for Research in Nutrition and Food Safety (INSA) of the University of Barcelona.

How do invasive plants spread?

The great resistance and dispersal capacity of the invasive plants has completely transformed the flora on the Mediterranean coasts. The native flora, on the other hand, does not have such efficient spreading mechanisms as the invasive plants.

The new study, focused on *Carpobrotus*, *Acacia*, *Agave*, and *Opuntia*, reveals the sophisticated strategies of invasive plants to occupy new habitats successfully and move the native flora.

"The most paradigmatic case is that of the genus *Carpobrotus*, which includes several plant species; some are already capable of forming hybrids so specially adapted to Mediterranean habitats that they can colonise areas as specific as the coastline of the coasts of Catalonia", says Sergi Munné-Bosch, who has been featured as one of the most influential experts in the world according to the prestigious Clarivate Analytics list of 2023.

"They are very resistant to changing conditions associated with climate change and show a perfect combination of clonal and sexual reproduction to be able to colonise new spaces quickly. In addition, one of the most important characteristics of this genus is its ability to create persistent seed banks that remain buried for years".

Today, one only needs to walk along the coastal paths of the Costa Brava and other parts of the coast to see the effects of these plants. "The case of the *Opuntia* genus is also very evident along the coastline of the Alt Empordà and southern France, among many other places with fragmented habitats, which are the areas most susceptible to colonisation by invasive plants", stresses the author, member of the Department of Evolutionary Biology, Ecology and Environmental Sciences.

Human activity and biological invasions

The author notes: "These biological invasions have been caused by ourselves, humans, by creating a high propagule pressure (number of seeds or plant components arriving in a given area) in these fragmented habitats".

"All these areas show a significant characteristic: the footprint left by humans. Human activities (gardening, urban planning, tourism, etc.) end up fragmenting natural habitats and facilitate the introduction of new species that then adapt extraordinarily to the spaces that we have modified forever", says Sergi Munné-Bosch.

"After all, it is our lack of knowledge that has led us to have Mediterranean habitats particularly threatened by the presence of invasive plants that will never return to the way they were before".

Prevention to protect the environment

Historical records show that many invasive species have benefited greatly from human-driven reintroductions. Thus, conserving natural areas away from the threat of invasive species and preventing future colonisation are the only effective strategies to preserve the natural environment.

"We have to prevent the invasion of colonising plants where they have not yet been introduced by human action. Even if there are many awareness campaigns, likely, we will never manage to eradicate them, at least in some areas", says the researcher.

"We must be aware that the unintentional introduction of a single plant (in landscaping or as a result of the construction of a road or a new development) in a place unsuitable from a nature conservation point of view can lead to major changes in our natural ecosystems. Our activity can greatly influence natural ecosystems and lead to their degradation. Preserving nature is the best investment to preserve the existence of our species, and that is why the protection of natural areas must be a priority", concludes the expert.

Source: University of Barcelona Press Release

of ageing on ejaculate traits suggests the jury is still out on whether age-related deterioration in ejaculates happens universally in animals or not".

According to the researchers, the sharp contrast in ejaculate ageing patterns between most animals and humans might be because humans now live much longer than they did just a few centuries ago. This may have led to men now living beyond the age at which they evolved to maintain sperm function. Co-lead author Krish Sanghvi (Department of Biology, University of Oxford), said: "The surprising differences between animals and humans could reflect stronger selection pressures for animals to maintain sperm function across all ages."

The researchers also investigated whether age impacted reproductive outcomes (such as fertilisation success and fecundity) in the males of these species. Similar to ejaculate traits, they found that, overall, reproductive outcomes did not improve or decline with advancing age, which is again in stark contrast to what is seen in humans.

According to the authors, the results may be partly explained by methodological limitations, such as studies rarely testing animals that are at an advanced age for their species. They also suggest that deterioration in male fertility might not be occurring for each ejaculate trait in every species.

Senior author Dr Irem Sepil (Department of Biology, University of Oxford), said: "Reproductive deterioration is of interest to a broad range of disciplines, from evolutionary ecology and demography to humanities and medicine. Our study challenges a key belief in these fields that male reproductive deterioration is universal and documents where we may expect this to occur and why."

Source: University of Oxford Press Release