In this issue

Providing Refuge for Pests

Reducing chances of resistance

Introducing only one toxin from *Bacillus thuringiens*is in cotton to ward off chewing insect pests was found to lead to resistance among the pests. So, two or more genes to reduce the harm done to the crops became a norm. But by the time *Bt* cotton came to be cultivated in most fields in India, it became apparent that even multiple genes were not adequate. To reduce the chances of resistance among insect pests, the *Bt* cotton seed suppliers were instructed to include about 20% non-*Bt* cotton seeds. This was initially packed separately and most farmers did not use the non-*Bt* seeds, not realising the need to provide a refuge for the pests so that they don't evolve.

In a General Article in this issue, Mohan Komarlingam S. examines the strengths and weaknesses of the refuge-in-bag concept adopted by agricultural planners. He also highlights the opportunities and cautions about possible threats inherent in the practice. For a thought provoking article, turn to **page 1746**.

Seismology Meets Archaeology

The first seismograph in India was set up in Pune in 1898. There have been many earthquakes earlier, recorded in historical texts. And there are adequate evidences and tell tale marks left behind on old buildings. A Review Article in this issue highlights the importance of the old buildings damaged by earthquakes as a method to understand seismic phenomena in Pakistan, India and Bangladesh. The authors provide a focussed account on the studies done near Delhi, around the Konark temple in Odisha and around Mahabalipuram near Chennai.

The authors suggest that before old buildings damaged by earthquakes are demolished or repaired, trained archaeoseismologists should be allowed to conduct studies to extract the details of past earthquakes. Turn to **page 1767** for the details.

Yellow-throated Bulbul

Prospects in peninsula

The yellow-throated bulbul is one of the 93 threatened birds of India. The passerine bird seems to prefer scrubby forests with rocky outgrowths. So the species is distributed in the southern parts of India where such habitats are available. But extensive granite mining for exports is threatening the habitats. However, the scientific data needed to convince planners about the need to take steps to protect the species is sparse. To understand the habitats of the bird, case studies on sightings are not adequate.

So Ashish Jha and Karthikeyan Vasudevan from CSIR-CCMB took up environmental niche modelling to identify potential sites for the species in the Deccan Peninsula.

Besides compiling, screening and verifying occurrence records from secondary sources, the duo undertook extensive field studies spanning more than three years to study the bird's habitat, behaviour and ecology. They recorded habitat features such as elevation, vegetation, presence of water bodies, rocky outcrops and anthropogenic pressures on the bird. Using Google Earth and ArcGIS, they recorded 102 points where the presence of the bird was absolutely certain. The monthly data of environmental variables were taken from ISRO's Bhuvan platform and averaged across years. By trial and error, they realised a ruggedness index is better than elevation as a factor to include in their modelling. Using MaxEnt for the environmental niche modelling, they used up 70% of their data for training. The remaining 30% of the bird presence data was mixed with large number random points where the bird was absent. The model turned out to be highly predictive. Bird lovers may like to turn to the Research Article on **page 1815** for more information.

The team went on to ascertain the extent of overlap of the predicted distribution of the yellow-throated bulbul with existing Protected Areas in the region. The vulnerability of the bird to changes in climate was also checked. Ultimately, protecting the rocky outcrops in the Deccan peninsula from profiteers seems to be the perfect solution for the threatened passerine.

Caddisflies in Kallada River

A pollution indicator

Trichoptera, literally meaning hairy wings, is closely related to butterflies and moths. But unlike the leptidoptera, most trichopteran insects lay their eggs near water bodies and the larvae are aquatic – a feature they evolved in the Triassic Period, to escape predation. Commonly called caddisflies, these insects have been mooted as water quality indicators.

Researchers from St Stephen's College, University of Kerala undertook a study of caddyflies in the Kallada River, Kerala. They selected six sites for sampling caddisflies. Two sites upstream were in protected areas. Between the two selected in the midstream area, one was highly urbanised and the other was rural. The downstream sampling sites were in the estuarine area were the Kallada River joins the Ashtamudi lake. They also took samples of water from all the sampling sites.

Then came the ardous task of identifying the more than 4700 specimens of caddisflies that they had collected and relating the diversity and numbers of the caddisflies to the water quality. Though they could not identify all the caddisflies to species level, it was clear that the presence and absence of different caddisflies taxa in the Kallada River can indeed be used as bioindicators for the assessment of water quality. Turn to the Research Communication on **page 1845** for more details.

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