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Shh! Listen to the bats

The mountainous terrains of the Western Ghats are home to almost half the number of bat species found in India. Only a handful of bat diversity surveys, however, have been conducted there over the last few years. In these surveys, bat species were either identified by collecting dead samples on roadsides or by disturbing roosts to snare specimens. Such sampling methods are not only crude and ecologically invasive but also error prone. A Research Article, **page 631**, cites the first quantitative survey of bats in the Kudremukh National Park, Karnataka, where a three-pronged strategy of surveillance, which comprised mist netting, acoustic and roost surveys, was used.

Over a two-year period, mist nets were roped in sampling stations to trap the winged mammal. Once tangled in the nets, the bats were identified, their sex was determined and their physical measurements were recorded. Then, they were released into acoustic flight tents where their ultrasonic echolocation calls, inaudible to the human ear, were recorded using sophisticated audio detectors. The researchers also looked for bats in caves, fig trees, and the undersides of bridges. Further, they also recorded the ambient noise of the forest hopeful of 'hearing' the echolocation calls of other bat species.

The results of the study are promising: as many as 20 different species were identified – 17 by mist netting, 2 by roost surveys and 1 from ambient echolocation recordings. The study also uses the acoustic profile of the bat's echolocation calls to serve as a thumbprint of the species. In fact, when the audio recordings of the bats are analysed, it is possible to classify the individuals to their respective species with a high degree of certainty. Therefore, acoustic profiling of bats could serve as a non-invasive method to identify different, and perhaps undiscovered bat species in future surveys.

Earthquake prediction an oxymoron?

'Only fools and charlatans predict earthquakes,' said Charles Richter many dec-

ades ago. His statement was rooted in the belief that earthquakes, like weather systems, are extremely complex systems, and almost impossible to predict. Today, however, seismologists believe that by detecting seismic and acoustic fluctuations, by observing atmospheric disturbances, and by monitoring electromagnetic (EM) emissions, an impending earthquake can be predicted many days in advance. In fact, recent studies testify that anomalous EM emissions are closely associated with future earthquake activity. Contrary to these studies, in a Review Article, **page 596**, a researcher from NIMS University, Jaipur, believes that placing one's faith solely in these emissions to serve as alarm signals is a dubious proposition.

According to the review article, earthquake prediction systems modeled to detect anomalous EM emissions are not reliable for several reasons: (a) the EM emission studies are largely empirical in nature and very little is known about the dynamics which cause the anomalous EM emissions; (b) the intensity of EM emissions before an earthquake is low, and often goes undetected; (c) the presence of natural and anthropogenic EM fluctuations hinders the detection of seismic EM emissions; and (d) the EM emissions are highly directional, lowering their detection probability. Yes, the EM emission model has predicted several earthquakes and saved thousands of lives, but the same model has also failed on numerous occasions, and has often sounded false alarms – further undermining its efficacy as a prognostic tool.

In the history of humankind, the record of earthquake prediction has been rather dismal. Statistical analyses have demonstrated that even the most unambiguous predictions are fortuitous guesses. So, is the prediction of earthquakes 'inherently impossible'? To answer this, it would be most prudent to first understand the 'earthquake' better.

'Food-webs' explain Adivasi lifestyle

Kerala's Wayanad district, nestled in the mountainous Western Ghats, is home to 20 different Adivasi tribes. Many of these tribes are agrarian, and their livelihoods are intertwined with forest

resources. The last few years, however, have witnessed a drastic reduction in their native agricultural activities; an alarming number of suicides; and their giving up of the joint family model. It appears that socio-economic changes, such as industrialization and tourism, have transformed the social and occupational structures of these tribes. A General Article, **page 572**, reveals the details of this transformation by probing deep into the lives of three tribes: the Paniyas, Kurichyas and Kurumas.

In this study, teams of German and Indian ecologists and sociologists gleaned information about the agrarian and social practices of the tribes by holding interviews and group discussions with the Adivasis. Then, the insights gained into the Adivasi lifestyles were mapped onto 'social-ecological webs'. In this graphic 'web', which is analogous to the food-web in structure and function, the social and occupational components of the tribes are linked using a cobweb of arrowheads and straight lines. It is observed that the magnitude of social and occupational transformation of the Adivasis bears a strong correlation with the number of interrelations between the components of this web.

From these webs one learns that the Paniyas are undergoing maximum transformation in their social and occupational structure, followed by the Kurumas and the Kurichyas. The landless Paniyas are the most dependent of the three tribes on the forests for their agrarian activities, and with socio-economic changes such as deforestation destroying cultivable land, their social structure is witnessing a radical upheaval. The Kurumas are not solely dependent on farming, and in response to the socio-economic changes, many of them are seeking formal employment and higher education. The Kurichyas, however, have simply diversified their farming practices, and are thus insulated to significant changes in their inherent social structure. Overall, one can conclude that changes in the agrarian system strongly shape social transformation processes in all three communities.

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