

In this issue

Soil Erosion in NE Himalayas

Causes and consequences

The North East has hilly terrain and abundant rainfall – a recipe for high soil erosion. But add unsustainable land use practices and it turns out to be a recipe for disaster. A Review Article in this issue examines studies from the region, evaluates the relative contributions of different land use practices and suggests site specific remedies to reduce soil erosion. Prepare for some surprises and many insights when you turn to **page 772** in this issue.

Rainfall Trends

North-East India

North-East India is among the regions receiving the highest rainfall in the country. Researchers from the Dibrugarh University collected monthly rainfall data for 120 years, from 1901 to 2020. The data covered Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Mizoram, Tripura and Sikkim. The researchers segregated the monthly data into four seasons: winter, pre-monsoon, southwest monsoon and post-monsoon and used various non-parametric methods such as the Mann–Kendall test, modified Mann–Kendall test and trend free pre-whitening Mann–Kendall as well as the more recent innovative trend analysis method to check which is the best for describing the rainfall trends in the region.

The modified Mann–Kendall test performed better at predicting changes in rainfall distribution in the region across seasons, they say, but that too, to only a certain extent. Read the Research Article on **page 801** to understand the trends in rainfall in the last 120 years in the seven states of the North-East.

Pollinating Efficiency

Bees for black mustard

In an attempt to maximise agricultural output, farmers in the Himalayan regions cultivate a mixed crop of wheat

and mustard. The productivity of black mustard, however, depends on pollinators. A Research Article in this issue examines the pollinators found in the fields of Chamoli and Rudraprayag districts.

Though there were 18 species of pollinators, two bees were found to be the predominant pollinators of mustard: *Apis dorsata laboriosa* and *Apis cerana indica*. The researchers went on to compare the foraging behaviour and pollinating efficiency of the two species.

When two related species forage for the same resources, they tend to partition the time of flower visitations. So the researchers started monitoring the diurnal foraging activity of the two species, observing flower visitations by the pollinators from seven in the morning to eight in the evening, counting the number of flower visits per minute and recording the time spent in each flower. They thus collected data on more than 200 bees of both species. The researchers also estimated the pollen load and pollen carrying capacity of the two species.

Apis cerana was more abundant, visited more flowers per minute and spent more time foraging. *Apis laboriosa* was more aggressive, often displacing its sister species from flowers, spent more time in each flower and collected more pollen.

The authors suggest keeping *Apis cerana*, a more easily reared species, near crop fields to improve mustard productivity. Turn to **page 840** for more.

Forests of Himachal Pradesh

Carbon sequestration potential

Estimating the carbon sequestration potential of a forest, without destroying it, is not a straightforward task. A non-destructive method, of estimating the carbon sequestered by a tree, consists of measuring the girth at about 132 centimetres above ground, calculating the diameter, calculating the above and below ground biomass with

equations that use the calculated diameter and then dividing it by two, assuming that carbon constitutes half of the biomass. There are quite a few other assumptions in this procedure and the result may not be highly accurate. Yet, if the task is to compare the carbon sequestration by forests in different locations, we are on a firmer footing.

A Research Communication on **page 846** in this issue compares and contrasts carbon sequestration in six forests, separated from each other, in Himachal Pradesh. Besides ecological factors, frequent forest fires and disturbances by humans reduce the potential of forests to fix carbon, say the researchers.

Trees in India

Oxygen production potential

The State of Forest Report 2019 by the Forest Survey of India uses the criteria of the tree canopy density of more than 10% in more than one hectare as found in satellite images, double checked by ground truthing as the definition of forests. A Research Communication in this issue uses the data to estimate the annual oxygen production potential by forests in India. The researchers dig deeper and calculate the oxygen production potential of forests state-wise, of the top ten trees in and outside forests, of trees used in agroforestry and of bamboo species.

Forests in Madhya Pradesh produce the greatest amount of oxygen. Sal stands first among forest trees and mango trees outside forests in terms of their capacity to produce oxygen. Among trees used in agroforestry, the poplar comes first. Bamboo, one of the fastest growing grasses, is the best for creating oxygen parks, say the researchers. Turn to **page 850** to find out the oxygen producers to plant this year.

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