In this issue

Indian Watershed Development

Evolution of the programme

To conserve soil and water resources and to sustain agricultural production, watershed management programmes were initiated during the 1950s in India. In the early 1970s, the Drought Prone Areas Programme was initiated. The Desert Development Programme and the Integrated Wastelands Development Programme followed soon after. All these programmes were driven from the top, focused on technical and structural aspects, and did not consider the communities that benefited. Hence, there was limited people's participation.

The formulation of the first guidelines for execution in the mid-1990s and the amalgamation of the programmes that were executed by different ministries under the Ministry of Rural Development formed a turning point for the watershed management programmes. A General Article by researchers from ICAR institutions traces the evolution of the watershed guidelines for the programme, dividing the progress into six phases, each with increasing focus on the development of people and their livelihoods as well as the budget outlay per hectare.

Turn to **page 968** in this issue for insights that may contribute to the development of watershed programmes in other countries.

Agriculture in N-E India

Support from space technology

Agriculture in the north-east of India faces many challenges: steep hills with small, fragmented farmlands, coexistence of shifting cultivation and settled farming, valleys threatened by annual floods and erosion, persistent clouds during the monsoon which limit photosynthesis,…

Even collecting data about acreage and estimating agricultural produce from the region was difficult till applications of space technologies stepped in. The region is now covered by various satellites with different resolutions, carrying a wide variety of sensors to scan the earth. When remote sensing technology is combined with geographic information systems and global positioning systems, it becomes a tool for evidence-based decision making. When machine learning algorithms are added to the combination to bring out relevant features from the vast information, the possibilities expand further.

Researchers from the North Eastern Space Applications Centre reviewed the possibilities: combining optical and radar data to discriminate between different crops and to estimate the acreage under each crop, multi-temporal satellite imageries to track crop phenology and health, and multi-spectral images to determine priority areas for irrigation for effective crop management… The technologies could also be used to assess flood risk vulnerability and categorize the extent of damages. They can also serve to map suitable areas for the expansion of economically important horticultural crops, to map soil resources and for land-use planning.

The technology of drones has now added a new dimension to the possible solutions to the challenges faced by agriculture in the north east. For details, read the Review Article on **page 975** in this issue.

Magmatic Intrusions Near Salem

The case of the Chalk hills

The Chalk hills, seven kilometres from Salem town in Tamil Nadu, are known for magnesite deposits. The magnesite complex there consists of two intrusions of mafic–ultramafic sequence, separated by gneisses and granulites – rocks that look banded or speckled. Thoti Yellappa at CSIR-NGRI has been trying to understand why, how and when these hills came to be. He collected 20 samples of rocks from the area for petrological and geochemical studies. Examining the rock samples under microscopes, delineating the minerals found within and analysing the elements helped elucidate the rock characteristics. Thermobarometry suggested that the rocks may have been formed under temperatures of around 820–932°C and pressures of about 10–12 kilobar.

From the available evidence provided in a Research Article in this issue, it appears that the Chalk hills of today were once upon a time a sea bed, which subducted and then was pushed up by magma to intrude through the Archean-Proterozoic crust around 800 million years ago. Turn to **page 1005** for more insights.

Antigone antigone

Gone are swamp hen chicks

A Research Communication in this issue brings out two instances of the sarus crane, *Antigone antigone*, predating on chicks of the grey-headed swamphen, *Porphyrio poliocephalus*, in the Dhanauri Wetlands of western Uttar Pradesh.

The sarus crane breeds along with smaller water birds. The species is known to be omnivorous. Yet, there are no accounts of its predating on the chicks of other water birds. In fact, most research on the Indian population focuses on the habitat and breeding of the bird species without considering its diet, bemoan the authors.

The sarus crane is a relatively well studied species. The lacuna of research on the diets of the largest known population of the species is perhaps an indicator of neglect of population dynamics and ecology of water birds in general in India.

Is predation of chicks of other water birds by the sarus crane a location-specific phenomenon or is it found worldwide? The Research Communication on **page 1054** throws a challenge at ornithologists.

K. P. Madhu
Science Writing Consultant
scienceandmediaworkshops@gmail.com