In this issue

Non Timber Forest Produce
Sustainable livelihood in Bundelkhand

Bundelkhand, hilly tracts of the Vindhyas that sprawl over many districts of Uttar Pradesh and Madhya Pradesh, represents a typical resource poor situation in India. Lack of agriculturally productive land, dependent on the mercy of the monsoon for even the scattered attempts at growing food, water scarcity... Add the slow pace of infrastructure development in the region and the bleakness of the picture is complete.

But people have survived there for generations. They have learned to depend on trees more than on the yearly sowing of cereals and pulses. A General Article on **page 994** in this issue surveys the economy based on tree resources in the region. Five important trees – *Butea monosperma, Phoenix sylvestris, Madhuca indica, Diospyros melanoxylon* and *Dendrocalamus strictus* – are analysed and the path of the products – gum, lac, leaf, flowers, seeds, jaggery, brooms, baskets, sticks and other value added products – is examined.

Agroeconomy is an activity of not merely growing food but also of selling the surplus for profits. Forest economy, on the other hand, is based on sharing of resources from commons between genetically unrelated often landless people, not for profit but for mere everyday survival. It would call for special policies and acts to provide sustainable livelihood in the region, say scientists in the ICAR–Central Agroforestry Research Institute, Jhansi, Uttar Pradesh.

Monitoring Pipelines
Parafoil aerial vehicles

Parafoil wings are made of two layers of light, nonporous fabric. Ribs of stronger material break the space between the two layers, into interconnected cells. The leading edge has open vents so as to create air pressure inside the cells, which inflates and maintains the shape of the parafoil wings that double up as a parachute. Suspension lines are used to connect the parafoil to the 'fly-bar' and that is where you are located when you are paragliding.

A slight breeze can lift it. And once airborne, it needs a little guidance, navigation and control. The fun of floating around has created communities of practitioners among adventure sport enthusiasts.

But now, scientists in the University of Petroleum and Energy Studies, Dehradun, suggest, on **page 1045** in this issue, that a mini version of this can be used to make an unmanned autonomous powered parachute aerial vehicle designed for monitoring pipelines.

They have worked out the guidance, navigation and control algorithm necessary for lateral and longitudinal motion of such vehicles theoretically and perfected it by testing it practically. This is expected to have immediate applications not only in pipeline transportation of petroleum or water, but also in the monitoring of canals, rivers, etc. reducing the difficulties in gathering data where human movements are costly.

Predicting Groundwater Levels
Evaluating theoretical models

Groundwater is a precious resource and, to reduce overexploitation, there is a system in place for monitoring. The data is available with the Groundwater Information System, Government of India (GoI), Ministry of Water Resources. But can this data gathered be used for predicting groundwater levels?

In a Research Communication on **page 1083** in this issue, scientists in the National Institute of Technology, Raipur, examine the strategies available for dealing with the recognizable seasonal variations and abrupt, unpredictable variations that groundwater levels undergo. Many scientists have used autoregressive integrated moving average (ARIMA) models to examine phenomena under similar situations of unpredictability of factors. There is, of course, the fuzzy time series analysis that may also be applied in such situations. Which is better?

They took the groundwater data of the Jainath region in Andhra Pradesh from 2005 to 2012 and used it for training the models to predict groundwater levels. And then they checked the predictions against the data of 2013. Both ARIMA and fuzzy time series analysis yield good results, but the latter is definitely better, say the scientists.

The Central Ground Water Board and other state level agencies involved in national groundwater assessment can now use these models to get better estimates of this common resource.

Pedestrian Problem at Crossroads
Prevention through precautions

Economic prosperity has led to an increase in the number of vehicles on Indian roads in the last few decades. And since population growth has also been progressing, there are enough pedestrians at Indian crosswalks, waiting for an opportunity to cross. Death of pedestrians in accidents thus crossed 12,000 in 2014. Equivalent to a fatal accident of a bus load of people every day! Safety of pedestrians is often neglected in favour of those who own motorized transport.

To prevent such crashes and ensure safe pedestrian movement, appropriate facilities should be provided at crossing locations. The Indian Road Congress document, IRC 103, which looks into the issue, was first published in 1988 and was revised in 2012.

Scientists from the Indian Institute of Technology, Roorkee, now compare the factors considered in other countries such as the USA, Canada, UK, Australia, New Zealand and Iran, and review the literature on the subject in a Review Article on **page 1016**.

Scientists suggest that besides macro parameters such as pedestrian volume, vehicle volume and vehicle speed, other factors such as vehicle gaps, pedestrian delay, number of traffic lanes, proximity to alternate crosswalk and crash history must be considered when making decisions on providing appropriate measures such as zebra crossing, traffic lights, etc. Preventing the deaths of pedestrians is a matter of taking adequate precaution.

K. P. Madhu
Science Writing Consultant
kp.madhu2000@gmail.com