

In this issue

Cropping system simulation model

In the context of climate change crop growth simulation models have proven promising tools in assessing the impact of climate change on crop yield and productivity at spatial and temporal scale. Adjudging the best management practice and adaptation strategies in agriculture with changing climate is the need of the hour. Crop growth simulation provide ample scope and opportunities in determination of best management practices in agriculture once a model is calibrated and validated for a given climatic condition and region. Cropping system simulation model (CropSyst) was used (**page 1451**) to simulate interactive effect of irrigation and nitrogen on crop yield and water productivity in maize–wheat cropping system. CropSyst, as any other model attempting to predict crop responses to the environment, is not a universal model. It requires some field data for calibration so as to represent a particular crop or cultivar of a given location.

Conservation actions and India's vulture populations

The loss of vulture populations from across the Indian sub-continent has become one of the most urgent and pressing conservation issues within India: three formerly abundant vulture species are now classified as Critically Endangered following population declines of more than 98% since the mid 1990s. Veterinary use of the non-steroidal anti-inflammatory drug (NSAID) diclofenac is responsible for the population collapse of these resident vulture species. Diclofenac is highly toxic to Gyps vultures and vultures are exposed to diclofenac when they feed from carcasses of livestock that have died within a few

days of treatment and whose carcasses contain residues of the drug. Birds that consume sufficient tissues from such carcasses die from kidney failure one to two days after exposure. Conservation efforts, including a ban on veterinary diclofenac and the identification of a vulture-safe alternative drug (the NSAID meloxicam), were introduced in 2006 in order to address the diclofenac threat. Sampling of domesticated ungulate carcasses available to vultures in India was undertaken prior to, around the time of, and 1–2 years after the ban in order to quantify the prevalence of diclofenac and meloxicam residues. More than 4,000 liver tissue samples were collected from nine states and analysed with a validated LC-ESI/MS methodology. Overall diclofenac prevalence levels declined by almost a half over the three surveys, with a corresponding increase in meloxicam levels in surveys 2 and 3. These surveys indicate that two of the key conservation actions being used to counter the threat faced by vultures – banning veterinary diclofenac and the promotion of meloxicam as a safe alternative – are beginning to take effect. See **page 1480**.

On the North Sikkim earthquake

The M_w 6.9 earthquake of 18 September 2011, close to the Sikkim–Nepal border is remarkable for two reasons. One, it is the largest instrumentally recorded earthquake to have occurred in Sikkim and two, its strike–slip focal mechanism is different from the thrust faulting earthquakes, typical of the Himalaya plate boundary. The vulnerability of the region to landslides and the proximity of the earthquake source to the major Tista River Hydel Power Project are the other factors that make the source of this earthquake signifi-

cant. Rajendran *et al.* (**page 1475**) report the effects of this earthquake and the response of structures, as observed from the post-earthquake field surveys in this region conducted a week after the earthquake. Although the damage to well-engineered structures were nominal, the severity of landslides and the potential for future slope-failures during the forthcoming monsoon are important factors that need to be attended to, from the hazard mitigation point of view, as pointed out in this communication. From the seismotectonic perspective, this event can be considered as an intraplate earthquake, on the leading edge of the subducting Indian plate. With its source close to a previously reported cluster of mid-crustal and sub-Moho earthquakes, the North Sikkim earthquake provides a fresh example to study the dynamics of the subducting Indian plate.

Heat transport in the Earth

Contrary to the popular planetesimal theory of Earth's formation, Herndon (**page 1440**) describes a new indivisible geoscience paradigm that begins with and is the consequence of our planet's early formation as a Jupiter-like gas giant and which permits deduction of: (i) Earth's internal composition and highly-reduced oxidation state; (ii) Core formation without whole-planet melting; (iii) Powerful new internal energy sources; (iv) Decompression-driven geodynamics that accounts for the myriad of observations attributed to plate tectonics without requiring mantle convection; (v) Nuclear georeactor generation of Earth's magnetic field; and, as particularly emphasized in the article, (vi) New understanding and ideas on the geodynamic basis for heat transport within the Earth.