

In this issue

Workplace–University Integration

Both higher education and research are mandates for multiple agencies in India. Greater appreciation of the relationships among science, technology and innovation as well as of the need for the balance among all three in the workplace for the social and economic development of the country have led to new experiments in interlinking higher education and research.

In a Research Article in this issue, R. B. Grover takes the case of the Department of Atomic Energy to show how education and research can be integrated in a workplace. The Homi Bhabha National Institute encompasses the research and development centres of the Department of Atomic Energy (BARC, IGCAR, RRCAT and VECC), Grant-in Aid Institutions under the administrative control of the Department of Atomic Energy (SINP, IPR, IoP, HRI, TMC and IMSc) and an off-campus centre at NISER.

Such a distributed structure, with highly focused, mission-oriented substructures can meet the national needs for human resources specialised for research and development in a knowledge-intensive and multidisciplinary domain like nuclear energy. Read on from **page 1140**.

Participatory Forest Management

Most of India's forests are outside protected areas where degradation is high due to fuel wood and fodder collection as well as grazing. So the National Forest Policy of 1988 envisaged joint forest management to balance the needs of local populations and the national need for forest cover.

G. Dhanapal reviews the history of developments provoked by the policy, examines factors that led to partial successes and failures and identifies areas that need attention for India to fulfil its promise to the international community about the amount of carbon that will be sequestered by 2030. And that too, while improving biodiversity, ecosystem services and the livelihoods of local populations.

The Review Article on **page 1161** in this issue provides recommendations for policy makers and also poses a few research questions to the scientific community.

Air Pollution in Delhi

Rigorous remedies

Living in Delhi is injurious to health. Besides the numerous automobiles and industries that spew out smoke, the crowded city bears the brunt of smoke from the burning of agro-wastes in Punjab and Haryana, the aeolian dust from as far as the Sahara, and, of course, the smoke from firecrackers that are burned for Diwali, for marriages, for winning test matches...

The solution to air pollution in Delhi needs to match the complexity of the problem itself. Scientists from Bhopal and Jhansi analyse the issues involved to come up with a comprehensive list of recommendations in a Review Article on **page 1153** in this issue.

Building Earthquake Resistance

Confining masonry

Earthquakes become disasters when buildings collapse. There are ways to strengthen buildings by using reinforced masonry. However, the costs of construction go up. Scientists from the CSIR-Central Building Research Institute suggest a via media between unreinforced masonry and reinforced masonry: confined masonry.

Their experiments show that unreinforced masonry wall panels confined by lightly reinforced horizontal and vertical concrete elements improve the performance of buildings of up to four floors. The cost is only marginally higher than that for traditional masonry, but the safety is much higher.

Turn to the Research Article on **page 1174** in this issue.

Seismicity of the North-East

Patterns in probability

The Indian plate, meeting the resistance of the Eurasian plate on the north to form the Himalayas, started moving counter-clockwise

and pressed eastward, against the Indo-Burmese plate. The north-eastern states of India nuzzle inside these two orogenic zones. No wonder then that the slips, thrusts and faults lead to numerous earthquakes, minor and major, in the region.

Scientists from the CSIR-North East Institute of Science and Technology, Jorhat and AcSIR examine the region's seismic data from 1918 to 2018 to look for recognisable patterns using purely probabilistic methods. They exclude minor earthquakes to focus on those that are greater than five on the Richter scale.

North-eastern states will be better prepared for future disasters by this study of the seismic past. Read the Research Article on **page 1167** for more details.

Passion Flower

Pulsed flowering

The flowering of a lone passion flower plant, *Passiflora incarnata*, in IISER Mohali, piqued the interest of the researchers there: the rate of flowering seemed to oscillate with a periodicity of about a month from April to December. So they got more passion flower plants to double check. And yes, they seemed to flower with synchronicity. And periodicity was clearly remarkable. Why?

The measured environmental factors did not seem to have any correlation. Such nonlinearity is usually seen to arise spontaneously in far from equilibrium systems. Quasi-periodic oscillations are also seen in prey-predator systems, typically described by the Lotka-Volterra model.

Assuming that there is a florigen and an anti-florigen – molecules that stimulate or retard flowering in other plants – they could explain the pulsed, synchronous flowering in passion flower.

Research on flowering has received a jolt with the Research Communication on **page 1211** in this issue. Don't miss out on reading it.

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