In this issue

Policy, Property, People

India was one of the first countries to consider having a scientific policy. Just two years after it became a republic, India came out with a Scientific Policy Resolution in 1958. It took nearly two and half decades to get to a Technology Policy Statement in 1983. Two decades later, in 2003, there was a clear formulation of a Science and Technology (S&T) Policy. Within a decade, that policy was subsumed by a Science, Technology and Innovation Policy in 2013. Now, within three years, the Government is formulating a new policy.

A General Article by Narendar Pani looks into the need for a new policy in such a short time. Current Indian S&T policies do not adequately meet the requirements of a market-driven economy, led by innovations. The relationships between science, technology and innovations and the diffusion of the outcome in terms of ideas, products and services that lead to economic, social, political and cultural transformations in society have to be put into context.

The dynamics of policy formulation have gone through a sea change between 1958 and 2016. It has become less opaque. Discussions and debates that are hallmarks of a vibrant democracy have become possible due to the increase in literacy in general and scientific literacy in particular. And the new media provides a platform for voices that were never heard earlier. The General Article on **page 1624** in this issue, we hope, will initiate a well informed debate, at least amongst scientists and academics in the country.

Coal Mine Fire

Coal meets nearly four-fifths of Indian energy requirements. The engine of economy demands increased production from the few coal mines in the country. In terms of the deposits required to feed the demand, India is in an enviable position. But quite often, as it happens elsewhere in the world, there are outbreaks of fire in Indian coal mines too.

Fire spells funeral for miners. It means smoke and pollution for nearby areas. And it implies economic loss for the nation. A Review Article on **page 1639** in this issue puts the problem in context.

As a case study, the authors take the Jharia coalfields in Jharkhand, the state that produces most of the prime coking coal for the country's needs. The Review Article provides necessary information and suggests modifications to the relevant Acts in India. But the focus is on the measures to manage and mitigate the problem globally.

Multifractality in Indian Music

In the mid 70's when people were playing around with early versions of computers, a mathematician was plotting the results of an equation containing a complex number, in a reiterative manner. And to his surprise, the results were quite fascinating: the patterns that emerged were beautiful to look at; but more interestingly, when you zoom into a small part of the pattern, it seemed to bring out a pattern that was so similar to the original. Similar, but different. And the mathematical discipline of fractals was born.

It did not take long for people to recognize that this was an important discovery. Fractals had fractional dimensions. A river is not a straight line, mountains are not cones and clouds are not spherical. The new discipline brought out the fractional dimensions of natural structures. Mathematicians could paint trees, mountains, rivers and clouds with equations. And they looked more realistic than any painter could ever imagine. Scientists were suddenly seeing fractals everywhere. Terms such as scaling laws and power laws started appearing in almost all disciplines.

Soon mathematicians realized a hidden complexity: fractals that keep changing their dimensions in different directions. And the notion of multifractality was born. This too spread to other disciplines like wild fire. Patterns in time and space that hitherto seemed too complex to explain suddenly became simple enough. Even the complexity of literature, music, painting and other art forms came under the purview of this simplicity.

A Research Communication in this issue looks at speech and Indian classical music through the lens of multifractality. And it reports results that geeks would welcome with glee: moods and emotions conveyed by different ragas can now be delineated by computers. Automating music recognition is only one of the possibilities that emerge. Read on from **page 1817**.

Soil + Water = Prosperity

Hidden factors in the equation

Soil and water support primary production. We depend on these two factors for food. Insufficient rainfall is making the soil of semi-arid regions calcareous. On the contrary if irrigated with poor quality of water the soils become sodic and chemically degraded to affect crop production.

A Special Section in this issue brings together fifteen articles that spell out different approaches to manage soil and water resources sustainably for improving the livelihoods of farmers. From techniques to reduce calcium carbonate in soils to methods of improving soil productivity, to agricultural practices that help improve soil fertility, to reducing water use in irrigated areas without sacrificing crop yield, to managing the available water through engineering and land modifications, to strategies that have shown replicable results, the special section has tips and tricks that can be adopted or adapted – not only in India, but in other agricultural countries as well.

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