

## In this issue

### Support for Science

#### *Quid pro quo won't work*

When Alexander Fleming returned to his lab following a holiday, he was greeted with fungal growth in one of his culture plates. A closer examination showed that the bacterial colonies surrounding the fungus had died while colonies further away were thriving. This observation ultimately led to the discovery of penicillin. Such capacity for drawing logical conclusions from mere observations is the essence of science. But some questions demand that observations be carried out at extreme scales

For instance, particle physicists trying to study Higgs Boson have to deal with a size of the order of  $10^{-20}$  m. This requires the development of special tools and techniques which in turn requires high capital investment. Most science projects are funded through taxpayers' money. So people expect quick returns on the investment. However, not all scientific endeavours yield immediate material returns. For mega-science initiatives, this process is even slower and often in kind.

Such pursuits are driven purely by a quest for knowledge. So, for developing economies like India, it is not always easy to fuel such initiatives. But in recent years, the Government of India has extended support to many mega science projects. In a General Article in this issue, Rashmi Raniwala and Sudhir Raniwala from the University of Rajasthan, discuss science and mega science, how they shape our society and why we should care. Read more on **page 2440**.

### Focusing on Forest Fires

#### *Satellite imaging for climate change*

Forest fires release huge amounts of gases like methane, carbon dioxide, carbon monoxide and nitric oxide into the environment. Particulate matter, aerosols and ozone are also produced and all these emissions can affect the local climate.

Previously, such statistics were projected from field studies. But recently,

scientists have started using satellite imaging to obtain this information.

Lodged in an orbit between the sun and the earth, these satellites have a bird's eye view of vast areas that may be affected by plumes of smoke. They also contain sophisticated sensors to detect the levels of greenhouse gases.

Recently, a team of scientists from the National Remote Sensing Centre, Hyderabad used this technology to study how the April 2016 forest fire in Dehradun impacted the atmosphere.

They tracked the changes in tropospheric gas concentrations during the forest fire and compared the results with air composition and aerosol density before the event. They also used computer simulations to understand how pollutants were spread in the surrounding area. In a Research Article on **page 2504**, they share their findings.

It is incredible how satellites, initially developed to serve military interests, are now being adapted to study the environment and track conservation measures.

### Setting up Wind Turbines

#### *Local factors affect performance*

Places that receive ample wind are ideal for setting up wind farms. Air rushes through the blades of a windmill, setting them in motion. This kinetic energy is then used for clean and renewable energy production.

But there are various factors that influence the success, efficiency and expansion of wind farms. While many global issues have been studied and discussed, local issues influencing the setting up of wind turbines have received less attention. For instance, in Maharashtra, more than 60% of the state's wind energy potential has been utilised. But the utilisation pattern is haphazard. Some of Maharashtra's high wind-potential districts, like Nashik and Pune, still utilise only 15% of their wind potential.

In a Research Article on **page 2467** in this issue, scientists discuss the

local parameters that could contribute to this disparity.

They first identified the factors that play an important role in the setting up of wind farms. Then they looked at the year-wise performance of each wind farm for different years and correlated it with changes in local parameters.

The scientists believe that by studying local influences, both governments and scientists can selectively start addressing factors that hamper the growth of wind farms.

### Producing Lithium-Ion Batteries

#### *Indigenising power storage*

Lithium-ion batteries are efficient and technologically superior. It does not come as a surprise then that they have outpaced lead-acid batteries as the power source for electrical vehicles. As India plans to expand its electrical vehicles sector, the demand for lithium-ion batteries is slated to rise. By 2020, lithium-ion batteries are expected to supply 13.8 GWh power for electrical vehicles alone.

Presently, India imports all its lithium-ion batteries. To meet the rising demand, it is in the national interest that the domestic production of these batteries is initiated at the earliest. But there are several limitations to indigenising battery production. The most critical of them is the absence of lithium carbonate – the raw material that is required in bulk for battery production.

So, even before the batteries are produced, it is important that we estimate our lithium requirement and identify the countries that can supply the raw materials. Besides this, there are other requirements, in terms of minerals and technology. Now scientists from the Center for Study of Science, Technology and Policy Bengaluru have provided ways to address these issues in a Review Article on **page 2453**.

Sarah Iqbal  
e-mail: sarah.iqbalv@gmail.com