In this issue

Fighting Forest Fires

It's summer again. Time for forest fires. Fires don't care about the Indian Forest Act 1927, which had a policy for forest fire suppression, or the National Forest Policy 1988, which further underlined the need to protect forests from fires. Between January and June every year, thousands of hectares of forests burn.

Dealing with forest fires is not merely about saving forests, but also an issue of reducing aerosols and CO_2 emissions. So the National Remote Sensing Centre and the Forest Survey of India use a MODIS fire sensor onboard two satellites and send alerts on forest fire hotspots to the State Forest departments during the dry season. But these are coarse scales and the assessments of forest fires made are not realistic. They fail to map small scale burnt areas.

So scientists from the Indian Space Research Organization and the Indian Institute of Space Science and Technology used an AWiFS satellite sensor with 56 m spatial resolution and wide coverage. The satellite revisits the area every five days. So it can be used in spatial and temporal fire detection.

AWiFS operates in four spectral bands. Scientists used short-wave IR, near IR and red spectral bands to highlight active fires. Smoke plumes and burnt areas are better distinguished in the Short-Wave IR spectral channel. They registered the images into orthorectified Landsat datasets. With scant nation-wide data that distinguishes between forest fires and fires in scrub and grassland areas of India, they used a land use map and a forest type map with the same resolution as the satellite image. A forest cover map and a digital elevation model were added to derive more conclusions. The scientists used the 2014 active fire locations data from MODIS, to train the datasets.

In a Research Article on **page 1521** they report their findings. Which forests have more fires? Is there a temporal pattern in the occurrence of forest fires across India? Which districts are more affected? In which month? Where are fires mostly due to humans? There are enough insights in a few pages, for forest officers, administrators and decision makers. 'Historical remote sensing data can be used to prepare nationwide fire history maps for better formulation of forest fire control measures to minimize intensity and spread of fires', say the authors.

Gene Editing

It can't get any crisper

In prokaryotic DNA, there are short repetitive sequences. Repetitive sequences are normally boring. But in this case, the sequence reads the same, reading to left or to right: it is a palindrome! More interesting is the fact that it is interspersed with small DNA segments from viruses. These clustered, regularly interspaced, short palindromic repeats of nucleotide sequences are extremely useful to prokaryotes. Bacteria keep these viral DNA sequences in store, as a defense mechanism. After all, they too get infected with viruses. This is their equivalent of an immune system.

Whenever a bacterium encounters these stored sequences elsewhere, a set of associated genes are activated. They produce proteins which can recognize viral DNA sequences and cut or splice them at specific places. This renders the virus harmless. And perhaps the bacterium may store another segment of the viral DNA for similar use in future.

Bacteria have been doing this for millions of years. Then, a few years ago, humans discovered these palindromic repeats and realized the potential of appropriating the prokaryotic technique. And scientists gave these clustered regularly interspaced short palindromic repeats a pet name: CRISPR. Using CRISPR and the CRISPR associated system (CAS), it is now possible to edit DNA sequences, to cut and tailor genes to suit specific requirements... And then, all hell broke loose.

On one side, potential applications. On the other, ethical implications. On one side, the hype necessary to attract funding, on the other, fears of a real-life Frankenstein.

Fears are easily dispelled by understanding. And hype is made more sober. So read the General Article on **page 1346** in this issue.

Indian Women Scientists

A special section

International Women's Day this year was special. The international community has shifted focus from the Millennium Development Goals to Sustainable Development Goals. And women, it is expected, will play a major role in implementing the new goals.

From getting the right to vote, to the right to education and to socio-politico-cultural acceptance of gender equality, humans have come a long way. But there is still a long way to go. Gender parities in the number of women scientists in India, for example, are still very low. And in the top echelons of scientific leadership in the country, the disparity is even more obvious.

To counteract the remaining resistance to gender equality and equity, *Current Science* presents a special section in this issue (**page 1351**), where Indian women scientists discuss issues of their interests: gravitational waves, quantum entanglement, non-relativistic fluids, manipulation of cold atoms, nature of neutrino and its oscillations... – disciplines that are not considered women's forte.

And then there are women scientists interested in the strange properties of matter – magnetic shape memory alloys, thermopower materials, nanoporous aerogels, magnetic ion doped semiconductor quantum dots...

You will also find women discussing computational techniques, multiscale modelling, numerical modelling...

Biotechnology, ecology, evolution and palaeontology are areas where an average Indian expects to find women scientists. But Leelavati's land has bred many women mathematicians too.

Here is a wide selection from women scientists: not just to break stereotypes, but to provoke scientific progress.

K. P. Madhu
scienceandmediaworkshops@gmail.com