In this issue

Solar Water Purifier
An inexpensive solution

Clean drinking water is necessary for a healthy life. But with overexploitation of groundwater sources and diminishing surface water, many rural areas face the problem of water contamination. Stored water is often infected with bacteria and viruses and can lead to diseases if the water is not treated before consumption.

Even though many methods of water purification are available, most of these are expensive and cannot be used on a large scale, especially in rural areas. Considering this, solar water purifiers that rely on the Sun's UV rays for antimicrobial action, offer many advantages. They are simple to assemble, have low operational cost and can be of vital use in rural settings. But some studies have shown that the system may fail to function on a cloudy day. There is also a potential danger of toxins leaching out from plastics that are used in the design.

Anil K Rajvanshi and Noorie Rajvanshi have altered the design to improve the function of a traditional solar water purifier. On **page 32** they discuss the design and its projected cost. With the fixes projected by this duo in a General Article, exposure to the sky for 180 minutes, even on a cloudy day, will be sufficient to limit microbial activity.

Surface Plasmon Resonance
A new era in sensing

When light falls on a conducting surface, it can initiate oscillation of electrons on the surface. This disturbance – also known as surface plasmon resonance – can then influence the diffraction of light. Initially, prisms were used to focus a monochromatic beam of light on a metal surface. Changes in the bending of this wave were used to detect common physical processes like adsorption.

On **page 56** in this issue, scientists from the Vellore Institute of Technology, provide a complete description of the process and how it can be used for creating smart sensors. This recent advance has a lot to do with the invention of optical fibres and their integration with surface plasmon resonance.

Because optical fibres are flexible, inexpensive and small, they can be used to create portable sensors. Such systems can be coupled with a light source from mobile phones for remote sensing. They also allow more functionalization of the sensors. The scientists have described the construction and principle behind several different surface plasmon resonance-based sensors - those that can be used for detecting toxins, or bacteria or foodborne pathogens, or even for clinical tests. All this and more, in a Review Article on **page 56**.

Modelling Groundwater Recharge
A climate change study

Rising mercury has led to water woes all over the country. One sector that is particularly affected by water shortage is agriculture. When surface water declines or becomes limited for agricultural use, farmers pump groundwater for irrigation. This has sustained agriculture for a very long time. But because of rampant use, groundwater volume may decline if not recharged periodically.

The recharge depends on several environmental factors like temperature and rainfall. Now a team of scientists from the Central Agricultural University, Gangtok and the Indian Agricultural Research Institute, New Delhi have simulated the impact of climate change on groundwater recharge.

They have used different projected climate change scenarios to model the fluctuations in groundwater levels in an agricultural area in Karnal, Haryana for 2030.

Climatic scenarios differ in terms of changes in temperature and precipitation. The scientists used seven different climate change predictions to project fluctuations in groundwater recharge. Modelling was done for sandy loam soils and clay loam soils that are primarily used to grow sugarcane, rice and pearl millet. Both crop growing patterns and daily meteorological parameters for the area were taken into account. On **page 64**, in a Research Article, they share their findings on how the proposed climate change may affect groundwater levels. Hint: changes in precipitation may counter some of the effects of increasing temperature.

Coloured Water of Alappuzha
Causes and consequences

Between June and September, each year, the coastal waters of Alappuzha turn a yellowish-brown colour. This observation coincides with another fascinating marvel of nature, the formation of mud banks on the coast of Kerala. During this time, the mud banks adjacent to coloured waters become rich in shrimp and also receive large stocks of sardine, mackerel and anchovy.

Scientists have wondered about these occurrences and many hypotheses have been formulated but none could explain the simultaneous occurrence of all the phenomena. In a Research Communication in this issue, scientists from the National Institute of Oceanography, Kochi have addressed one of the conundrums associated with the mud banks of Alappuzha- what causes the browning of water?

The scientists examined the water samples and their physical properties like turbidity, temperature, etc. and on the basis of their findings they have formulated a plausible reason for the colour change. Their findings can explain the concomitant rise in the landing of shrimp and fish in adjacent mud banks. They also explain why this phenomenon is closely teamed with coastal upwelling – a physical process during which cool deeper waters move towards the surface. More on **page 152**.

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