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Bank filtration

River bank filtration is a technique in which river water is purified by 'sieving' it through the underground soil layers of the river bank.

In this technique, first, a powerful suction, akin to sucking on a straw, is created by water pumps at the mouths of extraction wells which are located a few hundred meters from the river. Drawn by this suction, the river water seeps through the river bed and trickles into the underground soil layers of the surrounding region. The micro-porous throats of these soil layers, owing to certain chemical and physical processes, continuously 'sieve' out pathogens and toxic pollutants from the river water as it oozes through and inches towards the wells. The river water, however, is not alone in its slither towards the wells. Groundwater from deep beneath, which is also drawn towards the suction, mixes miscible with the river water. This dilution of the river water with groundwater serves two purposes.

First, the groundwater, unlike the river water, is pure, and by diluting the river water, it is in effect filtering the water further. Second, it increases the volume of water that is being sucked through the 'straw' of the well, thus enhancing the flow rate significantly (it is a lot easier to suck on a whole glassful of water through a straw than on a single drop). Nudged by this impetus of momentum, the filtered water thrusts forwards, gushes up through the well, and, lightened of its burden of adulterants, is channelled to surrounding human settlements.

A General Article, **page 1118**, discusses the utilitarian value of bank filtration in the Indian context by delving deeper into different variables – technological and geophysical – that influence its filtration mechanism.

Relation between 'Ω' and groundwater

In the search for groundwater, electricity is used by a geophysical apparatus – vertical electrical sounding, VES – as a discerning 'eye' to probe into the deep rock layers of the underground.

In VES, two current electrodes are jammed deep into the ground, and the electrical resistance of each of the rock layers is calculated by measuring the voltage between the electrodes. The electric resistance of a particular rock layer is its identifying trait, and, owing to the presence of minerals, ores, and salts, varies between rock layers which are situated at different depths. Thus, the VES apparatus maps the underground, differentiating between soil, minerals, ore, and of course, groundwater. But a change in resistance alone, however, is not clue enough to signal the presence of water. It is only by examining other critical geophysical clues, such as the anisotropic character of the different rock layers and their porosity, can one deduce, with confidence, the presence of groundwater.

A Research Article, **page 1137,** investigates similar clues to reveal the presence of a huge groundwater reserve in Nagpur, India.

Literary thumbprint

A writer's handwriting is his veritable thumbprint, distinct from any other's. It mirrors the identifying traits of his personality – his idiosyncrasies, emotions, and his temperament – and is, therefore, inherently personal to that particular writer. A graphology study in this issue of *Current Science*, however, implicitly questions this singular nature of handwritings. It discovers, in the Indian context, that the second language – English – handwritings of whole populations who speak the same mother tongue are significantly similar to one another.

The reason for this congruence in the handwritings is that a common mother tongue is a great equalizer: It shapes generic similarities into the second language handwriting of writers. In other words, if the second language handwriting were moist clay, then the mother tongue is a nuanced potter. The mother tongue moulds the second language handwriting by subtly shaping in it features which are characteristic of its own self. The line spacing, the letter gaps, the strokes and loops, and other characteristic features of the mother tongue, all seep through the subconscious of the writer and influence his handwriting in the second language.

The English handwritings of native Bengalis, for example, comprise cursive strokes and a rhythmic writing flow, both of which are characteristic of the Bengali script. Further, their English handwritings, owing to the presence of such characteristic traits, are consequently very similar to one another. Such characteristic traits of the mother tongue, a Research Communication, **page 1177**, discovers are also present in the English handwritings of Hindi and Tamil writers. Therefore, by examining the English handwritings of different linguistic populations, one can not only deduce the native tongue of a writer, but also differentiate between whole linguistic populations.

Negatives of crop residue burning

In Indian villages, a few days before sowing season, the dense smell of ash saturates the air. Thick wisps of smoke curl above farms as the waste residues of the previous crop are burned intentionally by farmers.

This questionable practice, of crop residue burning, is thousands of years old, and is still prevalent because of the immediate benefits it bestows on the farmers. It efficiently clears the waste residues of the last harvested crop. It wipes out weeds and pests. It is neither labour nor capital intensive. And perhaps most important, it allows farmers to sow seeds in a small window of time. But unbeknownst to farmers, such indiscriminate burning is inimical to the environment in the long run, particularly to the soil health. The niche of the earthworm, whose faeces is a nutrient rich fertilizer, is compromised. Soil erosion is exacerbated. And substantial volumes of green house gases and toxic aerosols are released into the atmosphere. Further, since the livelihoods of millions of farmers are intertwined with the fate of the lands they plough, this practice has serious socio-economic ramifications as well.

A Research Communication, **page 1150**, attests to other such negative effects by considering the particular case of wheat residue burning in central India. Although the study does discover certain 'healthful' effects of this practice on the soil – an increase in labile carbon, for instance – its deleterious effects on the environment far outweigh them.

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