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National Agroforestry Policy

IN certain regions around the world, one is bearing witness to the revival of an ancient – seven thousand years old – land-use pattern. This land-use pattern not only improves soil health – reduction of soil erosion; increase in water retention; improved cycling of soil nutrients – but also, in some cases, is a more profitable alternative to both, agriculture and forestry.

Agroforestry is a sustainable land-use pattern where farmers grow crops along with certain tree species simultaneously on the same plot of land. Some examples of agroforestry practices include: The cultivation of maize in Zambia, along with a *forest* of *Faidherbia albida* trees; the cultivation of coffee, and pepper, along with dammar gum trees in Sumatra; and, the cultivation of food crops, such as rice and maize, along with teak trees in Myanmar. Surprisingly, however, in an agrarian economy like India – one of the world's largest producers and consumers of agricultural produce – something as economically and environmentally sustainable as agroforestry is confined to only a handful of regions. In fact, only a paltry 3.39% of India's area is covered by agroforests.

This is not to imply that the Indian government has been nonchalant about developing and implementing agroforestry projects across India, *No*, it is quite the contrary. Indeed, over the last few years, the Indian government has launched a number of projects – such as the National Bamboo Mission; National Horticultural Mission; National Biofuel Policy – still, however, the concept of agroforestry has simply not taken flight.

Several impediments have deterred the seed of agroforestry from taking root in the Indian soil, and also in the mind of the Indian farmer. Strict trade regulations; complicated legal procedures; a hesitancy in the minds of farmers (because, understandably, most would be loath to forego precious land area to plant trees instead of crops); and perhaps most important, 'the lack of a well-defined set of regulations and guidelines related to harvesting, transportation, and marketing of agroforestry produce' — all have made the Indian farmer sceptical about practicing agroforestry.

Therefore, to address such issues that hinder the wide-scale adoption of agroforestry, the Indian government, in 2014, took a path-breaking step: The adoption of a national policy for agroforestry.

The ambitious National Agroforestry Policy of 2014 (NAP) aims to develop sustainable agroforestry practices while encouraging their adoption not just in few select pockets, but across the length and breadth of India by the Indian farmer. A General Article, **page 1826**, delves deeper into the NAP-2014, and while discussing its positives, also delineates some flaws associated with its formulation.

Polyphasic species concept

'*I was much struck how entirely vague and arbitrary is the distinction between species and varieties.*'
– Charles Darwin,
'On the Origin of Species'

HOW does one differentiate between microbial species? There is no simple answer to this innocent, almost disarming question. And while it is relatively 'easy' to differentiate between *most* species of higher plants and animals by simply observing their morphology and behaviour, it is painfully difficult to differentiate between species of microbes – it's like differentiating between a grain of sea sand, and a grain of dust using only one's sight.

Microbes, being tiny, have a simpler morphology as compared to macroorganisms, and often the same species of microbe exhibit morphologies that are in stark contrast with one another when grown in different environments, and in some cases, otherwise different species of microbes share an uncanny resemblance to one another. Simply put, microbes are simply too small to have enough 'room' to be ostentatious with their morphologies, and although several microbial species have conspicuous morphologies, the ever scrupulous scientist would be reluctant to accept only morphology as a microbe's identifying thumbprint. So, *how indeed does one differentiate between microbial species?* One needs to probe deeper into *flesh* of the microbe.

Today, with the advent of advanced molecular techniques, researchers use a polyphasic species concept to differentiate between microbial species. In other words, researchers use a methodology that involves several 'phases' such as, – morphology, physiology, biochemical markers, and also DNA sequences – to differentiate between and identify microbe species. A General Article, **page 1804**, delves deeper into the polyphasic species concept, and delineates some techniques, such as MALDI and FAME, that are used in species identification.

Chinese universities superior to Indian universities?

ONE academic ritual most undergraduate science students can relate to is the countless number of hours they spend perusing websites dedicated to ranking universities. Students, especially those in their final years, decide on the basis of these rankings where to apply for higher studies. One should, however, be circumspect about taking the word of these rank lists.

Many of these global university ranking models – for example, the Academic Ranking of World Universities, the Leiden Rankings, the Taiwan Higher Education Accreditation Evaluation Council University Ranking, and the EU Assessment of University Based Research – are not comprehensive in their evaluation of university performance, and often, different ranking models award very different ranks to the same university. But what seriously questions the integrity of most of these ranking models is that they are parochial in their performance analysis algorithms: They consider either *only* the research output of the universities, or *only* the quality of research being pursued at the universities to determine their 'academic worth', and hence their respective ranks.

A Research Communication, **page 1922**, presents a statistical model that evaluates the academic performances of universities by considering both, the quantity – i.e. the number of science researchers engaged in publications – and also the quality and excellence of the research studies being published. The study then tests the efficacy of this performance analysis model by evaluating the academic performances of the higher education institutes of China and India.

The results are quite intriguing.

The study, for instance, discovers that although the Chinese institutions boast of a much larger pool of science researchers who publish a higher number of publications per annum, the Indian institutions rank higher when research quality and excellence is considered.

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