scholars. Further, inter-state migration by female research scholars was 29% and inter-institutional migration within a state was 36%. Inter-state migration by male research scholars was found to be 30% and 32% for inter-institution migration within state. Further, it has been observed that 44% female research scholars from academic institutions migrated to R&D institutes in contrast to 38% of male research scholars. The migration pattern indicates that female research scholars do not have any hesitation in moving out of their home states in pursuit of higher education and research.

Although problems associated with the retention of women in science and engineering are well defined, each career progression results in lower retention of women than the stage before it, similar to a leaky pipeline[4]. The Department of Science and Technology (DST), Government of India has established a Task Force on Women in Science to augment women strength in science. The main purpose of the task force is to ensure that the interests of women in science are well-protected and promoted by the government and other organizations and suggest measures to motivate girls to take up S&T for higher education[1]. A special 'Women Scientists Scheme' has been evolved by DST for providing opportunities to women scientists and technologists who desire to return to mainstream science and work as bench-level scientists. Eighty per cent of the women availing the scheme were in the age group of 30–40 years, published over 651 research papers in *SCI* journals. Thirty per cent secured regular positions in institutions, 21% pursued higher degrees and 3% were employed in the industry[1]. It is hoped that such directed efforts will help in bridging the gender gap in manpower engaged in S&T.

Our study has shown that research publication output of female research scholars is at par with male research scholars and commensurate with their numerical strength in academic and R&D institutions and the dogma that Indian women have reservations about moving out from their family protection in pursuit of higher education and research is unfounded. Concerted efforts are however required to motivate and attract more number of students, and females in particular, for pursuing research in science and engineering including medicine and agriculture, for striking a balance in the socio-economic development of the country.

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The cranes' castle

It was five in the morning, dark everywhere, trees dancing rhythmically in unison in the background of dark sky and a hum of wind passing through the woods. We – two nature club members and myself – were making our moves cautiously so as not to disturb the wildlife and also for our own safety. We were in search of the Sarus Crane *Grus antigone*, a large elegant bird. And the place was the exclusion zone of Narora Atomic Power Station (NAPS) located about 140 km northeast of New Delhi. Surprised? Well, you may be, but yes, I am indeed talking about the exclusion zone of a nuclear power plant! This 1.6 km radius area around the nuclear power plant is indeed home to several birds, mammals, insects and flora–fauna. That is because it is tranquil and safe here, and this human-habitation-free area has an abundance of food and water bodies.

As we were wandering slowly inside the exclusion zone amidst the bushes and trees, we heard a fabulous sound, rather a pair of voices, from a little far distance. It was loud, high-pitched and trumpeting. Unmistakably, the sound was that of Sarus cranes. Full of joy, we started moving in the direction from where the voices were coming.

The sky started becoming pale and the dawn had broken when we reached near a freshwater lake. On the banks, there stood a pair of Sarus cranes, trumpeting in a rhythmic manner. The sight was simply amazing! They were strolling gracefully and making calls in between. A few metres away, in front of the pair, reposing on a bund was a juvenile crane, probably one year old. It was a family – a child with its parents – and the place was their home (Figure 1).

The sun was still below the horizon at twilight. The movement of the Sarus cranes in the background of mild orange-tinted sunrays and the cooling towers of the nuclear power plant, and their sublime song with the ambience sound of bird chirpings made the place very special.

With its courtly appearance, the Sarus Crane is a tall bird of about 150 cm, nearly the height of a human being. It is indeed the world's tallest flying bird. With its wings spread, it measures about 260 cm. Spotting the crane is pretty easy, as it is large and unique. The Sarus Crane

Figure 1. A family of Sarus cranes seen in the backdrop of the Narora Atomic Power Plant.

is grey overall, with a striking red head. It has a long pointed bill in pale grey tint. Its eyes are generally brown and, at times, orange. It has long legs that are pinkish-red. Both male and female are similar, but the male is slightly larger than the female.

A 'vulnerable' bird as designated by the International Union for Conservation of Nature (IUCN) Red List data, the Sarus Crane has a total world population of about 20,000 individuals. In India, about 9,000 individuals are believed to exist. Besides India, it is found in Pakistan, Vietnam, Myanmar, Nepal, Cambodia and parts of Australia.

The Sarus Crane inhabits open grasslands, marshes, ponds, canals, sandy riverbanks and agricultural fields. Being omnivorous, it feeds on a variety of vegetable matter like seeds, grains and shoots of grasses and animal matter like molluscs, amphibians, insects and frogs. In India, the peak breeding season of the Sarus Crane is from July to October; however, if the conditions are suitable, it can breed anytime during the year. It builds its nest preferably on the bund in the middle of swamps, paddy field, etc. using vegetation such as reeds, straw and rushes.

Not just Sarus cranes, but several other birds, aquatic species and mammals inhabit Narora. The Narora region, including the exclusion zone of the nuclear power plant, is home to a large variety of wildlife. A recent study reveals that about 1,300 individuals of Indian Peafowl exist inside the exclusion zone. Besides, crocodiles, turtles, a variety of fishes, blue bulls, rabbits, foxes, butterflies, etc. are also the part of the wildlife present here. About 200 species of birds – both resident and migratory – are seen here during peak winter. A variety of ducks and several shore birds migrate to Narora every year. At least ten threatened species of birds can be spotted here. Because of the presence of diverse wildlife, Narora has been conferred the status of 'Important Bird Area'. The wetlands of Narora are internationally important and, indeed, the site has been declared a Ramsar site.

As the day set off, the sky became bright and the sun was in its full glory. The parent cranes soon flew away in search of food, leaving the child alone in the exclusion zone, which they felt was the safest place. It is the place where they stroll fearlessly, fly cheerfully and live peacefully. After all, it is the cranes' castle!

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Incidence of sandal spike symptoms in a one-year-old plantation in Karnataka

Santalum album Linn. (sandalwood) is a highly valued tree in India. The heartwood is extensively used for carving, a traditional art in Karnataka, Tamil Nadu (TN) and Kerala and the sandalwood oil is used in perfumery and pharmaceutical industries. The use of sandalwood in religious ceremonies and rituals dates back to several centuries. The plant is predominantly distributed in southern part of Karnataka and northern part of TN[1]. In these two states, due to stringent monopolistic rules, sandalwood tree was declared as Government property till recently. For long sandalwood was not cultivated and the natural population has also dwindled due to extensive illegal felling and smuggling. Therefore sandalwood was placed under the 'Vulnerable' category by the International Union for Conservation of Nature in 1997. Consequently, the governments of Karnataka and TN retracted the monopolistic policy in 2001 and 2002 respectively, and liberalized the policy for sandalwood cultivation and harvest by individual entrepreneurs and corporate bodies.

One biologically interesting fact is that sandalwood is a hemiparasite both at seedling stage and all through its life and therefore needs a perennial host plant. Sandalwood tree is highly susceptible to sandal spike disease caused by phytoplasma (earlier called mycoplasma-like organism, phytoplasmas are specialized bacteria that are obligate parasites of plant phloem tissue and transmitted through insects which eventually leads to the death of the tree, whereas Mycoplasmas are restricted to vertebrate hosts[2]). With the increased cultivation of sandalwood plantations, it is essential to review the status of sandal spike disease and its occurrence. During the survey of a one-year-old sandalwood plantation in Hagalwadi village, Gubbi taluk, Tumkur district, Karnataka, we noticed that young plants showed symptoms of the sandal spike-like disease. The plantation was established during August 2011 in an area of 1.9 ha. The plantation area was divided into two parts of 1.2 ha (plot A) and 0.70 ha (plot B) with a spacing of 4 m × 3 m and cowpea (*Vigna unguiculata*) as the intermediate host. Infestation was found only in plot B and none of the sandalwood plants was infected in plot A. It was observed that the leaves started shrinking by January–February 2012 and by May 160 out of 350 plants were completely infected. The infected sandalwood plants had all the typical symptoms of sandal spike disease such as little leaf, stunted height with reduced growth, malformation of laminae (reminiscent of mango malformation or phyllody occurring in inflorescence of plants either due to phytoplasma infestation or as a result of zinc deficiency) and the affected leaves having a spike-like appearance (Figure 1 *b–d*) compared with normal healthy sandalwood plant (Figure 1 *a*). It was noticed that plot B had been invaded by a common weed *Stachytarpheta indica* also showing symptoms as mentioned above. All the infected sandalwood plants have been uprooted to prevent further spread of the disease. Occurrence of spike disease symptoms might have been reported in young sandalwood seedlings in the forest area[3]. However, manifestation of spike disease symptoms being observed in a plantation has not been reported earlier. Further studies are being carried out to understand the vector–host and vector–pathogen interactions. It is suggested that