the Indian Institute of Science, Bangalore. One of the topics discussed was the production of material out of thin air by Godmen, in the context of conservation laws for mass and energy. A well-known economist was puzzled. He said, 'Why be rigid? Violation of conservation laws must be occurring all the time to some extent or the other. How does it matter?'. Many scientists rushed to explain that even small violations of this nature are way above the uncertainties in the conservation laws. Violation would be of great concern to the scientists.

What one is asking for is clear awareness of which are the areas of natural science subject to scientific method and which are not. Astrology is taught in several universities in India. At Delhi it is taught in the Department of Sanskrit. I would not like it to be studied or taught in any science department.

There is no demand in India for dismantling of beliefs, faiths or religion. There is, however, a need and demand for application of logic to remove superstitions and biases. However, science occupies a space which is quite different from that occupied by superstition and biases. Whatever one's attitude to superstitions, one can believe and practice science. This is what one is asking for. Live and let live.

1. Karanth, R. V., *Curr. Sci.*, 2006, **91**, 567.

N. PANCHAPAKESAN

K-110 Hauz Khas,
New Delhi 110 016, India
e-mail: panchu@bol.net.in

Conservation awareness and research to protect rare plants

The Millennium Ecosystem Assessment, a comprehensive analysis produced by 1360 scientists, determined recently that the health of the world's ecosystems has been severely damaged[1]. Ecosystems provide essential services to people around the world. Of the 24 ecosystem services examined, including provision of freshwater, food, regulation of climate and air quality, the assessment found that 15 (62.5%) of them are being degraded or used unsustainably[1]. Furthermore, another assessment from the World Conservation Union summarizes a grim statistics on the current status of global plant diversity – of 70% of the plant species assessed, 45% has been classified as endangered or critically endangered[2].

India is among the 25 hotspots of the richest and highly endangered eco-regions of the world and it harbours a diverse species of fauna and flora. The enchanting wild animals such as elephants, rhinoceros, lions and tigers have been given considerable conservation attention over the last few decades; but the less attractive plants have thus far been overlooked. Plants play a major role to give life on the planet by tapping the sun's energy. They serve as food source for many animals as well as humans. They also improve the quality of the air that we breathe. However, people tend to admire and appreciate animals more often than plants – why?

As a matter of fact, people do not see all of their surroundings by just opening their eyes. Objects that are between 0 and 15° below the eye level receive more visual attention. Researchers have calculated that each second, the eyes generate over 10 million bits of data for visual processing, but the brain extracts only about 40 bits and fully processes only 16 bits that reach our conscious attention[3]. Usually the brain searches for movements, colours/patterns, objects that are known, and other potential dangers/threats. In general, plants are stagnant and mix well with the background, and they seldom pose a threat to people; so they miss our visual attention[3]. As a result, there is a natural human tendency to ignore plants; therefore it is important to promote plant conservation to create public awareness on the role of plants in maintaining life on our planet.

India's plant endemism is estimated at 33%, with 140 endemic genera[4]. Forested areas in the northeast, Western Ghats, northwest and eastern Himalayas are considered the richest in terms of plant endemism. Besides, the Andaman and Nicobar Islands contribute at least 220 species to the endemic flora list. About 6% of the global diversity of flowering plants (15,000 species) occurs in India alone[4]. However, threats ranging from habitat destruction to biological invasion and commercial exploitation to pollution from use of nitrogen/phosphorus fertilizers continue to threaten the survival of endangered plants in India and elsewhere. Biological invasions are a major environmental concern due to their negative impacts on biodiversity and economics. There is no science to predict which in-

Figure 1. A natural pond in Tamil Nadu, South India infested with two invasive plants, *Ipomoea carnea* and *Eichhornia crassipes* (Photo: G. Agoramoorthy).

troduced species will become invasive and when. Parties to the Convention on Biological Diversity[5] and other international bodies have recognized the urgent need for risk-analysis frameworks that will better enable prevention and management of this problem.

Effective protection of locally endangered plants will involve a few simple steps. Educators at all levels tend to use animal examples to teach basic biological concepts, whether in the classroom, laboratory or field condition. It is important to use botanical means of connecting animals in the biosphere when teaching students at all levels. The inability to perceive plants in our environment leads to failure in understanding the significance of plants in our daily life. Thus, we miss out on the aesthetic and biological features of plants. There is a mistaken notion that plants are unworthy of any significant consideration. Children should be given the opportunity to grow plants, and appreciate plant life and to realize that human life depends on plants. Plant conservation projects can be initiated in villages, towns and cities to protect native plants; local 'plant protection' societies/clubs could promote public awareness. Public lands that harbour rare local herbs, climbers and trees need to be protected and invasive species need to be eliminated. Exact estimates of economic damage caused by invasive plants are not available for India. So future research can be focused on this aspect. Research to monitor the population status, distribution and ecology of rare/endangered plants needs to be conducted thoroughly throughout India. In this way, appropriate mitigation measures to stop local extinction as well as to extend legal protection to plants can be implemented in the near future.

1. Millennium Ecosystem Assessment, *Ecosystem and Human Well-Being: Synthesisature*, Island Press, Washington DC, 2005.
2. IUCN Red List of threatened animals. IUCN Publication, Gland, 2004.
3. Wandersee, J. H. and Schussler, E. E., *Am. Biol. Teacher*, 1999, **61**, 84–86.
4. *Flora and Vegetation of India – An Outline*, Botanical Survey of India, Howrah, 1983.
5. McNeely, J. A., Mooney, H. A., Neville, L. E., Schei, P. and Waage, J. K., A global strategy on invasive alien species. IUCN, Gland, 2001.

GOVINDASAMY AGORAMOORTHY

Department of Pharmacy,
Tajen University,
Yanpu, Pingtung 907, Taiwan
e-mail: agoram@mail.nsysu.edu.tw

NEWS

Emergence of the tenth planet

After a prolonged debate and suspense, Pluto was accepted as the ninth planet orbiting around the sun[1,2]. One of the major difficulties in the recognition of Pluto as the ninth planet going round the sun was its non-concentric orbit that did not conform to the general trend of elliptical motion of the eight planets discovered earlier, as shown in Figure 1. Scientific efforts for exploring the Kuiper belt continued and two more objects, 2005FY9 and 2003EL61, of somewhat smaller sizes were found. The recently discovered third object, known as KBO 2003UB313, is larger in size compared to earlier discovered nonconcentric planets[3]. A debate of the International Astronomical Union (IAU) was scheduled to be held on 24 August 2006 for taking appropriate decision about non-concentric orbits of planets. We sent our proposal by 11 August 2006 for reclassification: eight planets to be placed in the first category and Pluto to be placed in a separate category along with 2003 UB313, the fourth non-concentric planet. We also suggested new names based on historical developments of Indian ancient astronomy as 'Aryabhata' or 'Vivekananda'. In the meeting on 24 August 2006, a decision was taken in conformity with our suggestions, to a large extent[4]. The two smaller objects, namely 2005FY9 and 2003EL61, were not included and the remaining two non-concentric planets, Pluto and 2003UB313, were taken in a separate category of dwarf planets along with Ceres. The General Assembly named object 2003UB313 as Eris and its moon as Dysnomia. Considering the importance of 2003UB313, details were investigated and it was even named as the tenth planet.

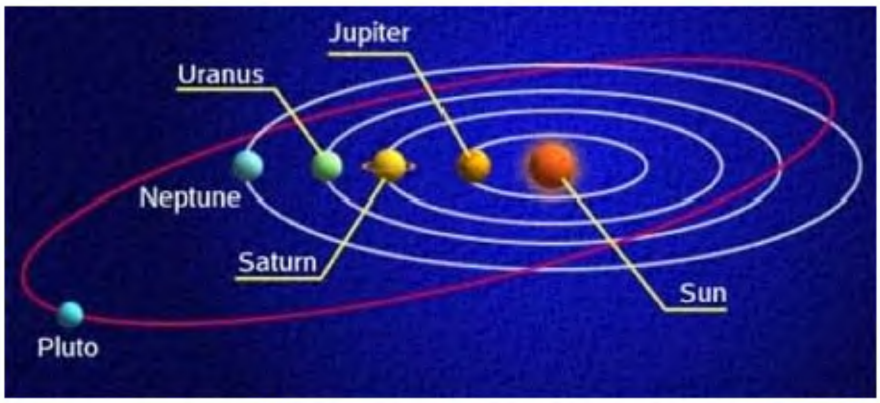

Figure 1. Pluto's non-planer orbit intersecting the orbits of planets.

1. Jewitt, D. C. and Luu, J., *Nature*, 1993, **362**, 730–732.
2. Jewitt, D. C. and Luu, J., *Nature*, 2004, **432**, 731–733.
3. Brown, M. E., Trujillo, C. A. and Rabinowitz, *Astrophys. J. Lett.*, 2005, **635**, L97–L100.
4. IAU 2006 General Assembly: Result of the IAU Resolution votes; http://www.iau.org/iau0603.414.0.html.

R. N. Singh, Formerly in the Department of Applied Physics, Institute of Technology, Banaras Hindu University, Varanasi 221 005, India; **A. K. Singh*,** Department of Physics, Banaras Hindu University, Varanasi 221 005, India
*e-mail: abhay_s@rediffmail.com