

harnesses this natural process by creating an artificial environment via a biogas plant, which provides conditions for bacterial action, and removes the methane gas produced so that it can be used as fuel. The preferred material for digestion in a biogas plant is animal dung due to its fine consistency. Dung and water are mixed and fed into the biogas plant daily. The digested organic matter called the 'slurry', is removed by an outlet that can be used as a natural fertilizer for crops.

I recently observed household biogas plants in villages near Dahod, Gujarat. A family with 4–6 members usually requires a 2 cubic m plant, which provides biogas for a total of 4 h daily (2 h in the morning and 2 h in the evening). The cost of a single biogas plant is US\$ 250. The Sadguru Foundation, an Indian non-profit agency in natural resources management, has established over 1300 household biogas plants in rural areas of western India<sup>3</sup>. The biogas plant is divided into three basic parts – an inlet or mixing tank where an equal ratio of cow dung and water are mixed daily, a digester that connects the inlet, and an outlet chamber where bacteria form to produce methane gas by interacting with dung and water. The outlet tank is connected to a digester, which receives the slurry. It is collected and used as organic manure. Building a biogas plant thus is simple

and cost-effective; a plant can be constructed within 20 days in a rural setting.

More than 600 million visitors globally interact with zoo animals each year and for the urbanites, zoos are often the only place where people can contact nature and wildlife. The visitors represent a powerful lobby whose knowledge, understanding and involvement can be positively harnessed for the benefit of nature, if zoos have an appropriate education strategy. Although the recent World Zoo Conservation Strategy covers a wide range of topics, there is no mention of biogas<sup>4</sup>.

Zoos around the world should prioritize biogas plants so that visitors can be educated on the importance of renewable energy. In USA, zoos on an average spend about US\$ 10,000 annually to dispose animal waste. The waste from herbivores mainly consists of indigestible plant fibre – a high-energy fuel material that can be utilized for cooking, heating and producing electricity sustainably. A zoo can start a biogas plant using a minimum of 500 kg/day of herbivorous animal waste for the production of biogas to enhance alternate energy use.

The average American consumes five times more energy than the average global citizen, ten times more than the average Chinese, and 20 times more than the average Indian<sup>5</sup>. The need for af-

fordable, clean and renewable energy to enhance sustainable development was highlighted recently by the World Energy Council and the UN Commission on Sustainable Development. Hence it is time for zoos around the world to look at animal dung as a bioresource to ignite alternate energy projects with the easily accessible biogas to send a powerful educational message to the millions of visitors. Zoo biogas plant is therefore an option that the global zoo community can no longer ignore.

1. Bell, C. E., *Encyclopedia of the World's Zoos*, Fitzroy Dearborn Publishers, Chicago, 2001.
2. Sodhiya, H. C. and Jain, K. K., *J. Rural Dev.*, 1988, 7, 427–432.
3. Jagawat, H., *Transforming the Dry Lands. The Sadguru Story of Western India*, India Research Press, Delhi, 2005.
4. The World Zoo Conservation Strategy, WAZA Executive Office, Bern, 2005.
5. Starke, L., Report, The World Watch Institute, Washington DC, 2004.

GOVINDASAMY AGORAMOORTHY

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

## National Scientific Research Regulatory Authority

With the passage of time and advancements witnessed in almost every sphere of science and technology, it has become essential that our country must have a high-powered national body for regulation and monitoring of research activity to maintain a register of researchers working in every corner of the country.

Such a body must function as a watchdog for most of the research activities (excluding sensitive areas like defence, atomic energy, space, etc.), and act as an arbiter for disputes and at the same time provide all necessary guidelines, support and facility for researchers. The National

register for researchers must readily provide necessary information about the researchers, such as their contact address, area/field of research interest, etc. This will prove a revolutionary milestone, especially for budding researchers, who are on the lookout for a suitable research supervisor and research laboratory. The proposed body must also prevent any possible duplication of research work, as the details of the project areas of all the registered researchers will be available on its website. Prevention of duplication of research work, and discouraging advancement of unproductive research acti-

vity, will check wastage of precious national resources and manpower. Mandatory registration of researchers will be beneficial in several other ways, and promote greater interaction amongst the fraternity.

PT. KARTIKAY PANDEY

Dr Pandey's Laboratories and Research  
Foundation,  
537Gha/84,  
Behind Madiyaon Police Station,  
Sitapur Road,  
Lucknow 226 021, India  
e-mail: drkartikaypandey@gmail.com