

## CORRESPONDENCE

it is 10% and it is increasing. Recent reports by the Ministry of Agriculture reveal that the dairy industry has the potential to offer about 4.2 crore jobs per year, whereas today hardly about 60,000 trained professionals are present in this field.

India's estimated milk production in the year ending March 1999, of 74 million tonnes, was 13% of the world's milk production. This has been appreciated by the United Nation's Food and Agriculture Organization (FAO), which has declared India as the world's largest producer of milk. FAO-estimated milk production of 71 million tonnes by USA in the same year is placed second in the list.

Data on estimates of milk production in the world and India during 1985–2000 reveal that a linear regression  $Y = a + bt$ , where  $t$  is the year and  $Y$  the estimate of

milk production, is the best fit to the data. For India, the estimates of  $a$  and  $b$  are 41.14 and 2.28 respectively, and for the world they are 501.85 and 3.80 respectively. This implies that an annual increase in estimate of India's milk production is found to be 2.28 million tonnes ( $P < 0.01$ ), whereas it is 3.8 million tonnes ( $P < 0.01$ ) for the world. Assuming that the rate of increase will remain the same for the year 2010, estimates of India's milk production will be 100.52 million tonnes, whereas the world's milk production is estimated to be 600.56 million tonnes.

The demand for milk products would increase as a result of increase in national GDP. In order to meet the demand, it is essential to have consistent increase in milk production, which will be possible

on successful implementation of 'Operation Flood' and evolution of new animal breed.

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## Geoscience curriculum

The article by U. Aswathanarayana<sup>1</sup> gives an insight as to how the earth science courses should be framed. But seldom are such views brought into practice. As rightly pointed out by the author, the subject of geology is a combination of various disciplines of science, but a candidate possessing a degree in geology has hardly any avenue in the job market today. This is due to the fact that geoscience education has failed to respond to the professional and practical knowledge that one needs. For example, the geological community has been taking up the issue of water crisis in India today seriously, but their voice is given the least priority. Engineers from departments like irrigation normally discuss water issues but a groundwater geologist's views are rarely taken into account. It is at the level of postgraduate degrees (M Sc, MTech) that the course of hydrogeology should be designed in such a way that it incorporates the engineering aspects of groundwater and also surface water.

In a recent symposium called 'Jal Parishad' in Pune, Sunita Narayan pointed out that 80% of agriculture in India is carried out by groundwater. This is an eye opener to geoscientists; the educators

involved in design of courses should include applications of groundwater to agriculture also. The practicals related to groundwater should be carried out in collaboration with State Groundwater Boards, wherever possible or with a recognized agency. A student studying for M Sc/ MTech degree should be sent with hydrogeologists from the Board to conduct surveys, carry out well inventories and study watershed management, especially during the summer months, when the water situation is grim.

The other aspect is that GIS techniques are normally not included in M Sc courses. The institutes that deal with teaching GIS courses should start distant learning courses for the benefit of those who have done their postgraduation and are working. Ceramic industry also has openings for geologists if the subject is taught well in industrial geology or industrial mineralogy. Energy sector is a potential employer and the opportunities in this sector are growing. The question is whether geoscience, as a multidisciplinary subject, is prepared to take up challenges in this sector? After the government of India has invited private sector investment in energy, especially in oil and gas explo-

ration, a lot of employment opportunities would be generated, particularly in deep sea reservoir studies, gas hydrates exploration, coal bed methane projects, etc.

As rightly pointed out by Aswathanarayana, the disciplines of geology, geophysics and meteorology tend to work as separate entities with hardly any coordination. All these disciplines should have a holistic approach instead of working differently. It would benefit students and researchers also in understanding the subject and would contribute in a large way to make geoscience a truly multidisciplinary subject and more importantly a job-oriented one.

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1. Aswathanarayana, U., *Curr. Sci.*, 2004, **86**, 766–767.

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