

## Need for evolving a methodology to measure groundwater discharge to the ocean to address coastal ecological problems

Age-old irrigation practices, uncontrolled exploitation of groundwater for aquaculture with an urge to make a fast buck at the expense of coastal ecosystem have caused irreversible damage to major segments of our coastal belt. Parts of East Godavari, Krishna, Prakasam and Nellore districts of Andhra Pradesh, coastal segments of Pondicherry, Tamil Nadu and Orissa have experienced considerable damage to the quality and quantity of groundwater. Since it is essential for us to know in detail the present nature of the groundwater regime to arrest, if not reverse the damage, we have to introduce practical scientific solutions that have received a good amount of success in different parts of the world. As a part of this exercise, it is essential that the direct discharge of groundwater into the coastal zone receives increased attention in the years to come, as it is known that this process represents an important pathway for material transport between land and sea. It

is essential to note that groundwater discharge often contains higher concentrations of dissolved nutrients and other components than does river water. Since there is considerable decrease in the discharges into the river system due to various reasons, including significant fluctuations in the monsoon activity due to regional and global effects and non-scientific exploitation of surface water bodies like ponds and tanks, the role of groundwater has increased enormously in maintaining good health of the coastal ecosystem.

While our rivers are reasonably gauged and analysed, allowing comparatively precise estimates of riverine inputs to the ocean, evaluating the extent and chemical mass flux of submarine groundwater discharge (SGD) continues to remain difficult. As detailed<sup>1</sup> groundwater defined here and elsewhere includes both freshwater originating from precipitation on land, as well as recirculating sea water associated with saltwater intrusion

along the coastline. The last part of the above, viz. sea water intrusion assumes significant importance from the Indian context.

Methodologies for quantitative assessment of SGD like modelling, direct physical measurement and tracer techniques can be adopted to find the nature of the coastal land to coastal ocean interaction. This may help us to introduce subsurface structures (with one-way opening shutters) that can arrest large-scale sea water intrusion, while permitting groundwater discharge into the ocean.

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1. Burnett, B. *et al.*, *EOS*, 2002, **82**, 117.

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## NEWS

### Netravali and Rao bag the highest award in science and technology in USA

The US President George Bush announced the laureates of the 2001 National Medals of Science and National Medals of Technology on 9 May 2002 and two scientists of Indian origin made the list.

The National Medal of Science is a recognition of the highest contribution made by an American citizen in any area of science. It was instituted by the US Congress in 1959, and is awarded annually. The National Medal of Technology is a recognition of the highest contribution made by an American individual or company for 'furthering this great country's place in the world'. It was established by the US Congress in 1980, and is awarded annually.

Arun N. Netravali received the National Medal of Technology administered through the Department of Commerce, the Government of USA. He is cited for his 'pioneering contributions that transformed TV from analogue to digital', revolutionizing the telecast and webcast technology. Arun Netravali works at the Lucent Technologies, Bell Labs, New Jersey, USA.

C. R. Rao received the National Medal of Science administered through the National Science Foundation, USA. Rao is distinguished, having received the S. S. Bhatnagar Award from India. Rao is internationally recognized for his work on statistics and its application in biological

classification. Among other awards and distinctions, Rao has received the Padma Bhushan and Padma Vibhushan from the Government of India, and Desikottama Award from the Viswabharati University, India. He has held several professorial positions and lectureships in USA, India and Europe. He is a member of the British Academy, the National Academy of Sciences, USA, the Third World Academy of Sciences, Italy, the Lithuanian Academy of Sciences, and the three Indian Academies of Sciences. He is currently at the Pennsylvania State University, Pennsylvania, USA.