# NEWS AND VIEWS AT A GLANCE

## Forthcoming Conferences:

As in the past, we provide below details of some important forth coming scientific conferences/events..

| Asia Oceania Geosciences Society 11th Annual Meeting | |
|---|---|
| Date | 28th July 2014 – 1st August 2014 |
| Discipline | Earth Science |
| Location | Sapporo, Japan |
| Weblink | http://www.asiaoceania.org/aogs2014/ |
| The 8th International Conference on Gas Hydrate | |
| Date | 28th July 2014 – 1st August 2014 |
| Disciplines | Earth Science, Engineering |
| Location | Beijing, China |
| Weblink | http://www.icgh8.org |
| Tephra 2014 | |
| Date | 3rd August 2014 – 7th August 2014 |
| Discipline | Earth Science |
| Location | Portland, United States |
| Weblink | htttp://www.geohazards.buffalo.edu/documents/Tephra2014.shtml |
| COSPAR 2014: 40th Scientific Assembly of the Committee on Space Research | |
| Date | 2nd August 2014 – 10th August 2014 |
| Disciplines | Earth Science, Life Science, Physics |
| Location | Moscow, Russian Federation |
| Weblink | htttps://www.cospar-assembly.org |
| Bangladesh Summit On Sustainable Development | |
| Date | 17th August 2014 – 19th August 2014 |
| Disciplines | Earth Science |
| Location | Dhaka, Bangladesh |
| Weblink | http://bangladeshsummit.org |
| Unconventional Resources Technology Conference (URTeC) | |
| Date | 25th August 2014 – 27th August 2014 |
| Disciplines | Earth Science, Engineering |
| Location | Denver, United States |
| Weblink | htttp://www.seg.org/events/upcoming-seg-meetings/2014/urtec-2014 |

| 2nd European Conference on Earthquake Engineering and Seismology (2ECEES) | |
|---|---|
| Date | 24th August 2014 – 29th August 2014 |
| Disciplines | Earth Science, Engineering |
| Location | Istanbul, Turkey |
| Weblink | http://www.2eceesistanbul.org |
| The 7th International Conference On Geoscience Education | |
| Date | 5th September 2014 - 9th September 2014 |
| **Disciplines** | **Geosciences** |
| **Location** | **Hyderabad India** |
| **Weblink** | **www.geoscied.org** |
| The 9th International Methane Hydrate R&D Workshop | |
| Date | 9th November 2014 - 12th November 2014 |
| Disciplines | Sciences and Technology of Gas Hydrates. |
| Location | Hyderabad International Convection Centre, Novotol & HICC Complex, Hitech city |
| Weblink | www.fieryice2014.org |
| The 51st Indian Geophysical Union (IGU) Annual Convention | |
| Date | 19th November 2014 – 21st November 2014 |
| Disciplines | Earth Sciences and Society |
| Location | Kurukshetra University |
| Weblink | www.igu.in |

## Science News:

## News on existing Pollution scenario:

Pollution in the name of development only leads to short term benefits and irreversible damage to life saving air, water and food. Knowing very well that pollution has to be reduced to overcome various setbacks, even the highly educated in one form or the other are contributing to pollution; a sad state of affairs. Whenever the topic is discussed in scientific circles, many show indifference. This attitude needs to be changed.

Industrially developed nations and those who intend to have indigenous industrial development have introduced number of problems due to air, water and environmental pollution. Till recently china contributed in a significant way to air pollution. It not only affected china but also neighbouring countries in particular and other far off countries in general. From the news received through CMS-ENVIS it is now evident that China has initiated apt measures to overcome this problem. The details are given below.

*China set to elevate environment over development in new law

**Beijing:** Smog-hit China is set to pass a new law that would give Beijing more powers to shut polluting factories and punish officials, and even place protected regions off-limits to industrial development, scholars with knowledge of the situation said. Long-awaited amendments to China's 1989 Environmental Protection Law are expected to be finalised later this year, giving the Ministry of Environmental Protection (MEP) greater authority to take on polluters. While some details of the fourth draft are still under discussion, it has been agreed that the principle of prioritizing the environment above the economy will be enshrined in law, according to scholars

who have been involved in the process. The fourth draft is due to be completed within weeks. In the absence of legally enshrined powers, the environment ministry has often made do with one-off national inspection campaigns to name and shame offenders, as well as ad hoc arrangements with local courts and police authorities to make sure punishments are imposed and repeat offenders shut down. It has also stretched existing laws to its advantage. Last year, it began to use its powers of approval over environmental impact assessments, which are mandatory for all new industrial projects, to force powerful industrial firms such as Sinopec and the China National Petroleum Corporation to cut emissions at some of their plants, threatening to veto all new approvals until the firms met their targets.

The new law would give the ministry the legal authority to take stronger punitive action. The legislation also proposes to formalise a system by which local cadres are assessed according to their record on pollution issues, including meeting emissions targets. Experts have welcomed commitments to improve transparency and compel polluters to provide comprehensive and real-time emissions data. Criminal penalties will also be imposed on those found guilty of trying to evade pollution monitoring systems.

Some experts opine that ultimate success of China's war on pollution would be determined not by symbolic new legislation but by specific targets and guidelines that are now being imposed on local governments. (Courtesy: CMS-ENVIS).

It is time India follows the Chinese model and ensures lessening of pollution.

Some recent initiatives and bottle necks are detailed below.

*Right to breathe fresh air

**New Delhi:** A Journalist, concerned about the welfare of our citizens, has come out with the following details, to warn us about the health problems in India due to pollution. It is time the scientists come out openly in support of stricter measures to save us from pollution related disasters.

`` Every individual has the right to breathe fresh air. As Indians holiday abroad, they realise how different it is to see clear skies without dark hues of pollution. Breathing such air is a pleasure. People from the West are very conscious of the quality of air they breathe and more and more Indians are taking cues from them. It is heartening to see citizens agitating for pollution free environment. Unfortunately, these agitations being isolated have not attracted the attention of the concerned officials and the common man.

On a sunny day in the West, weather forecasters on TV advise you to wear glares. Earlier, this seemed absurd to me but then I realised -- the problem is that on a sunny day in the West, the sun comes down on you directly and you are unable to see without glares, because of the lack of pollution. But the sun never shines on you directly on polluted Indian skies. Air pollution is the introduction of chemicals or biological material that is detrimental to health. I believe that air pollution is the price we pay for industrialisation. As fuel burns, the air gets polluted. Aircrafts, marine vessels, power plants, manufacturing factories, chemicals and dust products cause pollution.

Waste deposits in landfills generate methane gas which is highly toxic. Those living in Mumbai are destined to be immune to dust. Even if you lock yourself in air conditioned rooms, dust seem to gather. It is a shame because in other parts of the developed world, dust control measures are in force. The principles of dust control, however, are simple. It is important to water a construction site, especially before winds blow. Wind fencing with three to five barriers with 50 per cent or less porosity adjuvant to roadways is one of the best ways to prevent dust. Growing trees and shrubs on open sites also help control dust. We need to

steer clear of dust because it contains particulate matters and elevated levels of such matters can be harmful.

Natural gases that are detrimental to our health are methane and radon gas. Smoke and carbon monoxide from wildfire and volatile organic compounds released from vegetations, which react with nitrogen oxide, sulphur dioxide produce organic carbon compounds produce a seasonal haze of secondary pollutants. Lack of indoor ventilation also compounds the problem of air pollution.

The World Health Organisation (WHO) estimates that 2.4 million people die every year from air pollution, and a staggering 1.5 million of these deaths is from indoor air pollution. The most common pollutants are particulate matters, ozone, nitrogen dioxide and sulphur dioxide. The WHO also reports that the greatest concentration of particulates is found in poor countries and it increases the risk of asthma, pneumonia and lung infections. Only 12 percent of the people living in cities for which air quality data is available, are breathing "safe "air, reveals WHO`s Urban Air Quality database. About half urban population being monitored is exposed to air pollution that is at least 2.5 times higher than the levels recommended by the WHO.

Several developed countries have laid down standards such as the national ambient air quality standards and EU air quality directive. Such a scale gives the general public an idea that as risk increase, strenuous outdoor activities should be reduced or avoided. In India, the central pollution control board has a national air quality monitoring programmer where levels of respirable suspended particulate matters are assessed. However, there is no organised follow up to reduce the pollution. According to WHO more than 120 Indian cities, including Delhi, Mumbai, Ahmedabad, Agra, Varanasi, Kolkata, Hyderabad, Bengaluru, Chennai, and Visakhapatnam also figure in the list. WHO states in most cities where there is enough data to compare the situation today with previous years, air pollution is getting worse. The factors contribute to this increase are reliance on fossil fuels such as coal-fired power plants, private transport motor vehicles, inefficient use of energy in buildings and the use of biomass for cooking and heating. The latest available data have prompted WHO to call for greater awareness of health risks caused by air pollution, implementation of effective air pollution mitigation policies and close monitoring of the situation in Indian cities.

NGOs like the Centre for Science and Environment have stated that some of the worst forms of air pollution are found in Indian cities. 52% of 63 cities have critical levels of heavy particulate pollution exceeding 1.5 times the standard and 36 cities with high levels 1 to 1.5 times the standard and 19 cities at moderate levels which is 5 per cent below standards. (Courtesy: CMS-ENVIS and The Hindu).

Many of us are aware of these facts. But, when to take measures to curb pollution we show apathy. In the name of easier and faster transportation our cities and towns have become locales for vehicle generated pollution. It is time we change our mindset and try to reduce private transportation, to overcome pollution and energy problems. Solid wastes in cities need to be discarded properly or recycled to produce useful products. Unfortunately, in many cities (including Hyderabad- Secunderabad) the solid wastes are burnt in-situ leading to significant air pollution. We do hope the information given above may motivate the learned to take apt measures to curb pollution.

The above News items can be categorised as general. For some recent scientific research details we have selected, for this issue, details from Space studies. Please read and send your valued opinion.

**News on some important SPACE STUDIES:**

In an editorial P.R.Reddy and D.V.Reddy (Dec, 2013, IJEE, vol-6, no-6) have brought out a detailed exposition of "A Voyage to Mangala (Mars) for Understanding Planetary Systems". They have pointed out in the editorial that astronomers, in recent years discovered more than a thousand extra solar planets (exoplanets) enthusing an inquisitive scientist to find avenues to explore them. Increasingly, the astronomy and broader scientific communities are showing interest in climate and atmospheric conditions, which determine whether a planet can support life. Studies of exoplanet atmospheres are now at a pivotal stage. We currently know of only a handful of low mass transiting planets orbiting bright, nearby stars. It is expected that ongoing surveys of NASA such as MEarth and future missions such as the Transiting Exoplanet survey satellite will dramatically expand the sample over the next five years. As of now none have prepared a proper voyage schedule to go beyond our solar system, which is just a speck in the vast Universe. But, as a part of such a voyage NASA is contemplating to launch the James Webb space Telescope in 2018. This will far surpass the capabilities of Hubble and Spitzer telescopes for characterizing exoplanet atmospheres. Reddy & Reddy have further stated that scientists would definitely make efforts to send a space vehicle to the adjacent solar system, to explore planets orbiting cool, low-mass stars, as a proper step, to study detailed characterizing of Earth-like exoplanets. If ejecting from our solar system and successful entry in to the adjacent one is achieved Man will be in a position to colonialise some of the favourable planets. The authors conjectured that most probably the main intention of NASA in planning all these expeditions/arduous voyages is to locate at least couple of planets (exoplanets) that can provide needed atmosphere and life saving water for future Earthlings to migrate. Such an expedition has become a necessity as the only planet that could have contained water (Mars) seems to have lost once available water due to natural causes.

This entire thing sounds like a fantasy story, but may become a reality in the next one hundred to two hundred years, by which time living on earth may become very difficult with decreased availability of unpolluted water, air and food. In such a scenario, to be in a position to have part of the cake, to survive, it is essential to up the ante and bridge the gap in the space technology that got wider with 50years of India`s late entry in to the voyage race.

As we are anxiously waiting to hear the final success of Mangalyaan voyage to Mars, we have learnt in April, 2014 that scientists are building space ark to save human race. Scientists are developing an interstellar Noah's Ark – a self-sustaining spaceship that can carry humans on a one-way mission to find a new world to inhabit in the event of a global catastrophe. Researchers around the UK are working with colleagues from the US, Italy and the Netherlands on Project Persephone, investigating new bio-technologies that could one day help to create a self-sustaining spacecraft to carry people beyond our solar system. The spaceship would incorporate into its structure organic matter such as algae and artificial soil, using the sun's energy to produce bio fuel of food, The Times reported. It would need to keep a few thousand people alive for generations in a one-way mission to find a new world to inhabit, researchers said. According to the project website, scientists are "considering the application of living technologies that can respond to the needs of its inhabitants."

**KEPLER 186F**

NASA`s KEPLER Space Telescope--launched in 2009 has been on the lookout for earth- like planets within the habitable zones (the distance from a star within which water can exist in the liquid form) of remote stars. Among the planets it has located (the first, Kepler-22b, was found in 2011), Kepler 186f is the only one that is similar to the earth in size. It is 500 light years away from Earth in a constellation called Cygnus and, drawing from earlier research, is expected to

have a rocky surface. The planet orbits its sun--which is half the size of our sun--once every 130 days. From the surface of the planet, the brightness of the sun at noon is what our sun appears to be an hour before sunset. (Source: FORBES, May, 2014 )

**GRAVITATIONAL LENSING:**

Scientists continue to explore the Universe using powerful space telescopes. They generated different models of galaxies and estimated probable distance of distant objects( Milky Path, Galaxies, Black Holes etc ) using light waves, as measuring devises. The distances are valued in terms of Light years.

A NASA/ESA Hubble space Telescope image released in the beginning of May, 2014 shows the heart of vast cluster of galaxies called MACSJ1720+35. The galaxy cluster is so massive that its gravity distorts, brightens, and magnifies light from more distant objects behind it, an effect called gravitational lensing.

If distortion is introduced by Gravitational Lensing effect, there is every possibility of our distance measuring calculations going awry, exposing our limitations in understanding the dynamics of Universe.

**Use of Satellite data in monitoring Glacier dynamics:**

The details given above have exposed us to voyage in to space and opening up new avenues to enhance our knowledge of distant objects, including planets and exoplanets. Even though these expeditions are very essential to enhance our knowledge base, to address problems encountered by us on the earth due to various natural and manmade problems, we need to use satellite data. Acquiring Remote Sensing Satellite data of regions that are in accessible can help us in better planning and execution of disaster management and environment safety measures. National Remote Sensing Centre, Hyderabad a scientific lab of ISRO has carried out significant studies to understand the varied nature of Himalayan glaciers in time and space, using state of the art technological tools. Some details are listed below, to help us know about efficacy and limitations of the techniques used. To better appreciate the importance of these studies, let us first know briefly about glaciers and their importance.

A glacier is a persistent body of dense ice that is constantly moving under its own weight; it forms where the accumulation of snow exceeds its ablation (melting and sublimation) over many years, often centuries. Glaciers slowly deform and flow due to stresses induced by their weight, creating crevasses and other distinguishing features. They also abrade rock and debris from their substrate to create landforms such as cirques and moraines. Glaciers form only on land and are distinct from the much thinner sea ice and lake ice that form on the surface of bodies of water. On Earth, 99% of glacial ice is contained within vast ice sheets in the polar regions, but glaciers may be found in mountain ranges on every continent except Australia, and on a few high-latitude oceanic islands. Between 35°N and 35°S, glaciers occur only in the Himalayas, Andes, Rocky Mountains, a few high mountains in East Africa, Mexico, New Guinea and on Zard Kuh in Iran. Glacial ice is the largest reservoir of freshwater on Earth. Many glaciers from temperate, alpine and seasonal polar climates store water as ice during the colder seasons and release it later in the form of melt-water as warmer summer temperatures cause the glacier to melt, creating a water source that is especially important for plants, animals and human uses when other sources may be scant. Within high altitude and Antarctic environments, the seasonal temperature difference is often not sufficient to release melt-water. Because glacial mass is affected by long-term climate changes, e.g., precipitation, mean temperature, and cloud cover, glacial mass changes are considered among the most sensitive indicators of climate change and are a major source of variations in sea level ( Source: Wikipedia ).

Global climate change of the twentieth century had a significant role in modifying the glaciated mountainous environment. The fluctuations in climate had significant effect on down wasting of many glaciers globally. The sudden catastrophic discharge of large volumes of water from these lakes is a characteristic of many glaciated regions of the globe. Such glacial lake outburst flood (GLOF) can cause extensive damage to the natural environment, human property and lives as they can drain extremely rapidly and cause dramatic floods.

**Remote Sensing Study in Uttarakhand by National Remote Sensing Centre, Hyderabad:**

Uttarakhand carved out of northern Uttar Pradesh, is Located at the foothills of Himalayan mountain ranges. It is largely a hilly state, with rich natural resources (especially water and forests) with many glaciers, rivers, dense forests and snow-clad mountain peaks.

After 2013 Uttarakhand Catastrophe due to combined effect of cloud burst and glacier melting, a detailed study of Himalayan Glaciers has become very important as health of these glaciers is paramount for overall wellbeing of river systems originating from Himalayas. In the snow and glaciated terrain of the Himalayas, satellite remote sensing was established as the best tool because many of the glacial lakes are located at very high altitude. Cold weather and rugged terrain conditions made it a tedious, hazardous and time-consuming test to monitor these glaciers by conventional field methods.

A first level assessment of glacial lakes in Uttarakhand Himalaya in terms of number and types using Indian Remote Sensing (IRS) Satellite data has been made by NRSC. The study utilized data sets like cartosat DEM, topographic maps and OST maps. The assessment reveals six types of glacial lakes and a total of 362 glacial lakes in Uttarakhand Himalaya. The Inventory of glacial lakes in Uttarakhand Himalaya was carried out using multi-temporal satellite data of Resourcesat 1 and Resourcesat 2(Indian Remote Sensing (IRS) satellite data). Due to diverse seasonal variation, snow cover, cloud mask, data coverage gap, only limited number of scenes is available for the study area. Initial analysis carried out using resourcesat-1 scenes from 2005, 2008 and 2009, generated a first level inventory of glacial lakes in Uttarakhand Himalaya. But many lakes are missed in this attempt and classification of lakes has become very difficult because of the moderate spatial resolution of LISS data and dimension of the lakes. The final inventory of glacial lakes in Uttarakhand Himalaya was carried out with multi –temporal satellite data of Resourcesat -2. In this study carried out during 2011-2013, LISS sensor having 5.8 m spatial resolution has been used.

The glacial lakes inventory of NRSC shows 362 lakes in Uttarakhand Himalaya (Table -1). Among the lakes, supraglacial lakes are more in number and their dynamics shows their location and existence varies in time and space.

Table 1-Glacial lakes of Uttarakhand

| Sl.No. | Type of Glacial | Lake Number |
|---|---|---|
| 1 | Blocked Lake (BL) | 18 |
| 2 | Cirque Lake (CL) | 30 |
| 3 | Erosion Lake (EL) | 60 |
| 4 | Moraine-Dammed Lake (MDL) | 21 |
| 5 | Proglacial Lake (PL) | 12 |
| 6 | Supraglacial Lake (SL) | 221 |
| **Total** | | 362 |

Efforts are being made by ISRO to acquire cloud free data in time and space of all the above glaciers and also that exist in Sikkim Himalayas, to effectively understand Himalayan Glacier dynamics. Once such information is gathered needed efforts could be made to arrest degradation / recession of glaciers and there by save the environment.

**Know Your Peers: Living Legends**

In the last issue we started a new subsection in the science news to help the reader, especially the young, to learn about outstanding contributions made by senior scientists of international repute. In this issue we have brought a brief coverage of significant contributions made by Prof.U.Aswathanarayana and Dr. Syed Zahoor Qasim.

**Uppugunduri Aswathanarayana** (born 1928)

is currently the Honorary Director of the Mahadevan International Centre for Water Resources Management, India. He studied geology from Andhra University and obtained his doctoral degree on nuclear geology using the self built equipment, which was adjudicated by Arthur Holmes, F.R.S. of UK, J. Tuzo Wilson, F.R.S., of Canada, and Louis Ahrens then at Oxford. Later, he did post-doctoral work on Lead isotopes with Clair Patterson in Caltech in 1957, and Rb - Sr and K - Ar dating with S. Moorbath in Oxford, England, in 1963. He taught in Andhra University, University of Sagar, and many others like, California Institute of Technology, Oxford University, University of Western Ontario, University of Dares Salaam, Tanzania and Universidade Eduardo Mondlane, Mozambique.etc. He also served as a Consultant to UNDP, World Bank, Louis Berger Inc., and SIDA, while in Mozambique. He was also a UGC National Fellow, India (1976–79); UGC National Lecturer, India and UNIDO Consultant on Non-Metallic Minerals, Vienna (1988).

Prof. Aswathanarayana's exposure to the extremely serious human problems endemic in Africa, convinced him of the need to switch over to the application of geoscience to human welfare. Using geochemical and isotopic tools, he and his Tanzanian and Finnish associates could identify the pathways of geoenvironment-induced endemicity of diseases, such as fluorosis, stomach cancer and goiter. His work entitled "Innovative use of people-participatory technologies for poverty alleviation and improvement of the quality of life in Chamanculo, a slum area near Maputo, Mozambique" has been chosen by the Third World Network of Scientific Organizations (now Consortium on Science, Technology and Innovation for the South), Trieste, Italy and UNDP, New York, as an outstanding example of "Innovation in Development in the Third World". He instituted the Mahadevan International Centre for Water Resources Management on May 6, 2001, with the cooperation of Prof. G.O.P. Obasi, the then Secretary General, WMO, Geneva. The purpose of the Centre is to serve as a clearing house for water sciences and technologies in the developing countries. It is modelled after the Abdus Salam ICTP, Trieste, Italy, in its ethos, and mode of functioning. Like ICTP, the Mahadevan Centre offers a series of customized courses for the water scientists, technologists and managers from the developing countries.

Aswathanarayana has authored over 100 original scientific papers and ten books. His first book, Principles of Nuclear Geology (A.A. Balkema, Netherlands, 1986), was followed by a quartlet of books on the ecologically sustainable and employment-generating use of natural resources: Geoenvironment: An Introduction (A.A. Balkema, etherlands, 1995), Soil Resources and the Environment (Science Publishers, Enfield, USA, 1999), Water Resources Management and the Environment (A.A. Balkema, 2001), Mineral Resources Management and the Environment (A.A. Balkema, 2003).

Aswathanarayana is recipient of many awards: the Excellence in Geophysical Education, International Award ( 2007) of the American Geophysical Union; International Association of GeoChemistry; and Eminent Citizen Award in the area of Water Sciences of the Sivananda Trust, India (2007); fellowships from UNIDO (1989) and United Nations Office for Outer Space Affairs (1989). He has

also served as General Secretary, Geological Society of India (1976–1979); Chairman, Working Group on Isotope Geochemistry of IAGC(1979–1983); Leader, IAVCEI W.G. on Deccan Volcanism (1979–83) and Chairman of the Working Group on "Geochemical Training in Developing Countries" of the International Association of Geochemistry and Cosmo chemistry (1996–2008). He was UNESCO Expert affiliated to the Institute for Trace Element Research, Lyon, France (1991).

The Geological Society of India, Bangalore, has brought out his popular science booklet, "Natural Resources and Environment," (2003) which has been translated into other Indian languages. Advances in Water Science Methodologies (2005), The Indian Ocean Tsunami (2006), Food and Water Security (2008), "Energy Portfolios" (2009) are some of his recent books. His most recent book, Green Energy: Technology, Economics and Policy, is published by Taylor & Francis of the UK. He was also one of the Founder Fellows of IGU and provided needed support.

**Syed Zahoor Qasim**, born in December, 1926 in Allahabad, Uttar Pradesh, India, is a leading Indian marine biologist. Qasim had his schooling from Majidiya Islamiya Intermediate College Allahabad, and obtained B.Sc. and M.Sc. in 1951 from Aligarh Muslim University and bagged University Gold Medal. For some time he was a lecturer in the Department of Zoology at Aligarh before proceeding to the United Kingdom for higher studies in 1953. In 1956 he completed his D.Sc. and Ph.D. degrees from University College of North Wales.

Qasim is an Honorary Professor of many universities, including Aligarh Muslim University,Madurai Kamaraj University, Anna Malai University, Indian Institute of Technology Madras, and Jamia Millia IslamiaQasim. He led India's exploration to Antarctica and guided the other seven expeditions from 1981 to 1988. He was a Member of the Planning Commission of India from 1991 to 1996.

He was Director, Central Marine Fisheries Research Institute at Cochin (1970-73); and Director, National Institute of Oceanography (NIO), Goa (1974). He was Fellow, Indian Academy of Sciences, Bangalore; and Fellow of Indian National Science Academy New Delhi; Fellow, Third World Academy of Sciences; Honorary Fellow, Muslim Association for the Advancement of Science, Aligarh; Honorary Member, Asian Fisheries Society. He has authored several books: 1. The Indian Ocean: Images and Realities; 2. Indian Estuaries; 3. Biodiversity of Mangrove Ecosystems; 4. Living Resources of India's Exclusive Economic Zone; 5. Glimpses of the Indian Ocean; and 6. India's Exclusive Economic Zone: Resources, Exploitation, Management.

He had the honor of being the Chairman of Working Committee of Intergovernmental Oceanographic Commission (1976-80).He was also Secretary, Department of Environment (DOE), Government of India (1981). He has held several important positions: 1981: Leader of First Indian Expedition to Antarctica.; 1982: Founding Secretary, Department of Ocean Development; 1989-91: Vice-Chancellor, Jamia Millia Islamia, New Delhi. Chairman, Society for Indian Ocean Studies. Chairman, World Environment Foundation; 1995 : and Member, Dr. D. Swaminadhan Research Foundation (DSRF).

He was a recipient of many awards: -Padma Shri (1974), Chandra Hora Memorial Medal(1975),: Golden Jubilee Trust Gold Meda (1975), and Padma Bhushan (1982) .He was closely associated with IGU and served as the president of IGU during 1989-91 and helped IGU to gain needed recognition in the scientific circles. He was awarded the first IGU-HariNarain Lifetime Achievement Award for the year 2013.

**P.R. Reddy**