sothaman. He explained the uses of different parts and accessories of the spectroradiometer in collection of spectral signatures in the field and laboratory. He also demonstrated how to optimize the parameters to get the signature of particular objects in different light conditions using RS_3 software.

V. Jayaraman (ISRO, Bangalore) in his presidential address at the National Seminar dealt with importance of spectroradiometer for hyperspectral studies and future plans of ISRO in hyperspectral sensor. About 60 research papers were received and 30 were presented in five technical sessions. About 100 teachers/researchers from all over the country participated and deliberated on the present status and future scenario of hyperspectral and multispectral remote sensing. Sanjay Srivastava (ISRO, Bangalore) in his talk on the 'NICHE area of hyperspectral remote sensing' discussed EO pyramids, fundamental concepts in EO, target signature – image to object, spacecraft configuration and mission design, and the role of spectral signature and atmospheric transmission in VNIR region. According to him, spectroscopy of terrestrial targets from space and synthesis of high resolution spectral, spatial and radiometric data are required to ensure geophysical sensitivity for signature merging. Jayanti (MSSRF, Chennai) gave a talk on 'Advanced spatial tools for coastal resource management'. She pinpointed the problems and issues due to depletion of coastal resources like mangrove forests, coral reefs, mud flats and salt marshes and coastal wetlands. She also emphasized on coastal resources, recommendations of the committee constituted by the Government of India under the Chairmanship of M. S. Swaminathan, based on mapping of vulnerability line considering parameters such as elevation, geology, geomorphology, sea-level trends, horizontal shoreline displacement, tidal ranges and wave height. According to her, availability of high resolution and very high resolution data made the spatial tools indispensable in planning and management of resources.

Various aspects dealt within the technical sessions of the seminar include: (1) Hyperspectral remote sensing studies in minerals and agriculture studies; (2) Hyperspectral and multi-angular bidirectional reflectance measurements of some natural surfaces; (3) Remote sensing of canopy dynamics and optimum reflectance ratio for estimating biochemical content of fodder sorghum and bajra; (4) Creation of hyperspectral signature data base; (5) Retrieval of plant biophysical parameters from BRDF through inversion of radioactive transfer model; (6) Fourier Transform Infrared Spectroscopy spectra of natural crystals of low temperature origin: implications on interpretation of palaeoclimate, modelling sediment diagenesis and hydrocarbon exploration; (7) Advanced Synthetic Aperture Radar for recognition of coastal geomorphological features and land-use assessment; (8) Application of remote-sensing data in geomorphologic mapping; (9) Evaluation and evolution of Indian coasts – with a few case studies using remote sensing and GIS techniques; (10) Integration of Advanced Space-borne Thermal Emission and Reflection Radiometer and Enhanced Thematic Mapper data for studying the alteration zones; (11) Spatial distribution of mangrove, and (12) Geo-statistical analysis for geochemical interpretation of groundwater in hard rocks.

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MEETING REPORT

Preserving our scientific heritage*

Many scientific institutions in India have had a long history, some tracing back their origins to the Colonial period. These institutions have a vast collection of valuable information stored in various formats. However, there has been no tradition in India of archiving old documents and preserving them for posterity. Fragments of history are lost everyday as pioneers retire and institutions fail to take care of their documents. There is an urgent need to create awareness among science institutions to collect, preserve and catalogue their archival material and create modes of access for researchers. A National Workshop on 'Preserving our Scientific Heritage' was held at the Indian Institute of Astrophysics, Bangalore to address these objectives.

The workshop was unique as it brought together 100 participants from across disciplines comprising historians, librarians, scientists and policy-makers. Siraj Hasan (Indian Institute of Astrophysics (IIA), Bangalore) welcomed the participants and also read out the inaugural address sent by K. Kasturirangan. This was followed by special remarks by M. Vijayan (INSA) who emphasized the need to preserve material that were not of immediate value. Illustrating his point with an example, Vijayan demonstrated how processes and theories of scientific research sometimes received late recognition. The keynote address was given by Ross Bassett (North Carolina State University in Raleigh). He stressed the need for archiving of science in India, which would reflect indigenous perspectives. In his role as a consultant to the archives of IITs in India, he mentioned that several issues in archiving were linked directly to the absence of awareness among the policy-makers. He also pointed out that without archiving, when the first generation of scientists in India is no more, important parts of India's history would be lost.

Day 1, Session 1 – Collection policies and organization: The main points that emerged from this session were that archiving should be an ongoing process and should be started almost as soon as the institution is set up. All presentations

*A report on the National Workshop on 'Preserving our Scientific Heritage' held at the Indian Institute of Astrophysics, Bangalore during 21–22 January 2008, jointly organized by the Indian Institute of Astrophysics, the Indian Institute of Science, Bangalore and the Tata Institute of Fundamental Research, Mumbai.

emphasized the importance of policy statements for collection building and mapping institutional and organizational developments when setting up archives. Collection building would have to go beyond the institution itself to other institutions, and at times even to the general public.

An archive should incorporate reports, biographies, correspondence, newspapers, journals, audiotapes, speeches, photographs and oral histories. Preservation, digitization and mode of access to information available at the archives of the Chennai-based newspaper, *The Hindu*, was presented as an example of an institutional archives. Finally, most participants felt that library and information schools should incorporate programmes dealing with archiving and record management as part of their curriculum.

Day 1, Session 2 – Case studies of science archives: The first presentation covered the Indian Institute of Science (IISc) Bangalore, archives, which is currently being set up. The strong motivation for taking up this activity was the advent of the centenary year of IISc in 2008–09. The presentation gave an interesting history of the inception of IISc and demonstrated the efforts put in by the members of the archival committee to collect relevant and related materials to their archives both in-house and outside.

The Saha archive has been set up at the Saha Institute of Nuclear Physics, Kolkata. This has a vast collection of papers and documents of Meghnad Saha. The collection has an interesting trajectory as many of these documents were first donated to the Nehru Memorial Museum by Saha's son, and copies were procured for the institute's own collection.

The presentation on the Physical Research Laboratory (PRL) collection focused on the oral history recordings of scientists who had worked at the institution. PRL plans to integrate these recordings with the archival material of the organization.

The Tata Institute of Fundamental Research (TIFR) has recently set up its archives. This presentation focused on ways in which archival resource creation might lead to a critical institutional history. Apart from collecting scientific papers, correspondence, photographs and sound recordings, the TIFR archives has also initiated an oral history programme that records the life histories of scientists, mathematicians and administrators who worked at the institute. In addition to three exhibitions, the archives regularly displays archival materials for the TIFR community.

The IIA which traces its origin to the Madras Observatory founded in 1786, has a vast collection of materials dating from the 17th century. The library at IIA has played an important role in organizing these archival materials and also in facilitating on-line access to the users. Some of the rare items which are displayed in the archives include the original handwritten manuscripts, observational data dating back to the 18th century, and a first edition of Kepler's *Astronomia Nova* of 1609. The IIA archives has been providing scientific information from the archival resources to the historical projects initiated by IIA scholars.

The Jesuit archives located at Shenbaganur, Kodaikanal has a long history. It has a large collection of palm-leaf manuscripts in different languages, letters of missionaries, parish diaries, photographs and other material of historical value. The climate at Kodaikanal has been conducive to the preservation of archival material.

The National Institute of Mental Health and Neurosciences (NIMHANS) archives is being set up and its documents are being assessed and analysed at Bangalore. This presentation illustrated the story of the institute's progress with the help of archival data and captured the ways in which treatment regimens of mental illness changed over the years alongside changes in the disciplines of psychiatry, psychology and neurosurgery. Records of case studies are available at the NIMHANS archives and demonstrate the evolution of psychiatry and point the way to inter-disciplinary research in the future.

The first day ended with a public lecture by P. Balaram (Director, IISc). His talk entitled 'Private philanthropy public good – The early history of IISc', focused on a hitherto unknown segment of the history of IISc. In Balaram's words, the story of IISc 'is a story that begins with an act of philanthropy, unprecedented for its vision and unmatched for its generosity'. Balaram traced the events that led to the birth of IISc, starting from the 1890s when J. N. Tata mooted the idea of an Institute of Higher Education for India, based on his discussions with Swami Vivekananda aboard a ship. Tata set aside a huge sum of money for this scheme. Although the British did their bit to delay the scheme, it was Tata's trusted lieutenant Burjoji Padshah, who diligently pursued the scheme, regularly writing to Lord Curzon, till the institute was founded in 1909. Balaram then traced the early years of the institute, from its first Director Morris Travers and the early departments of general chemistry and electrical technology to the vibrant institute that exists today.

Day 2, Session 1 – Preservation and conservation 1: There were five lectures on preservation and conservation of archival materials. Some points emerging out of this session have been consolidated here. The speakers reiterated the necessity for extreme care while developing an environment that is most suitable for archives. This included building design, control of temperature, relative humidity and light. All speakers emphasized that special care should be taken to prevent destruction due to physical and biological factors, and improper handling. Staff should be sensitized about the fragility of the archival documents while maintaining an archival collection.

Speakers also stressed upon the need to develop a disaster management policy for every archives, keeping in mind the topography and climate of the area in which the archives is situated. A disaster response team should be set up in each archive, which can react immediately when disaster strikes. Staff should be trained regularly in control of fire and other natural calamities.

The next two talks were on preservation of archival material. Preservation of palm leaves is important as much of our heritage is embedded in them. In ancient times natural materials were used for preservation and this could be continued even now as the side effects are minimized. Neem and negundo leaves which are natural materials, have been found to be effective in preservation. Since current international trends in archiving stress the use of non-toxic methods, these methods of preservation could be adapted to the archives of modern science.

Session 2 – Preservation and conservation 2: Presentations on digitization and microfilming focused on the importance of technology in preserving archival contents. There is an urgent need to understand the medium of storage and to formulate policies for use of digitized contents. Microfilming was internationally respected as a dependable method of

preservation as it is known to survive for 500 years. There was concern raised about the storage of dynamic data for which microfilming is not the solution. Instead they should be stored in magnetic tapes and converted into DVDs and later to be adopted for use in next-generation digital storage technology.

Photographs are important archival material and documenting them is important not only for recording history but also in legal cases and in identifying lost or stolen objects. Photographs in different media need care while storing, and should be checked periodically by professionals for proper maintenance.

Session 3 – User's perspective: The afternoon session on user's perspective highlighted the difficulties faced by the science historians in tracing source materials. A majority of institutions in India like colleges, universities and societies have not cared to preserve their old records, nor do they have aids available to locate historical material. One presentation focused on the sources at the IIA archives that could trace the development of astrophysics in India. The second presentation highlighted the extensive use of archives outside India. The general perspective and feedback on the condition of archives within India focused on the need for professionalism and the creation of an user-friendly environment.

The last session of the workshop comprised a panel discussion on science archive in India moderated by Roddam Narasimha. Four themes were taken up for discussion: (i) copyright issues, (ii) how to develop archives, (iii) archival standards, and (iv) the need for a National Science Archives. Archivists are aware that copyright compliance is important in the display and use of archival material in archives. Unfortunately, guidelines are inadequate in India. In the absence of such standard guidelines, every archives sets its own rules based on existing (general) copyright laws and experiences. It is evident that permission should be sought from the authors before holding their work in any format. However, archives can hold material which have been generated by their own institutes. Archives should respect the copyright laws of other countries while holding material of other countries. For data which cannot be displayed on the web, the indications of their availability and metadata should be provided to the users. One important issue that is being debated widely is archiving 'orphan' works. It was felt that continuous efforts should be earnestly made to trace the author of the orphaned works.

Some of the important factors to be considered while setting up an archives were discussed. Any effort at setting up an institutional collection should avoid duplicating collections that already exist elsewhere within the same institute; for example, published material. Proper documentation of the origin of the source and acknowledgement of the contents were emphasized. Need for professional training in India was identified as one of the important aspects of setting up an archives.

An important point of discussion that evoked a great deal of debate was the availability of standards. Unfortunately there are no national standards in our country that can professionally guide the archives. Hence there is an urgent need for compilation of standards which should be taken up by a Central organization.

The need for a National Science Archives was raised. However, majority of the participants felt that it was more advantageous to create a network of science archives than a single centralized National Science Archives. It was also strongly felt that many institutions would want their archival material physically located within their own campuses. This would also ensure availability of local expertise in collecting and organizing material. Digitized material and metadata available with each archives could be networked and made available to others.

A significant recommendation made by the participants was the creation of a Forum or an Association of Archives in India that could enable the setting up of standards, modes of information exchange and development of guidelines for the creation of science archives. Such an Association could also enable smaller institutions in their endeavour to start archives.

Narasimha recommended that the advocacy document which emerged after the panel discussion be shared with policy-making bodies such as DST, INSA, IASc and CSIR.

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