Panel Discussion

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Astronomy for Developing Countries
IAU Special Session at the 24th General Assembly, 2001
Alan H. Batten, ed.

Summary of Panel Discussion

Abstract. The Special Session closed with a general discussion led by a panel consisting of R.K. Kochhar (India, moderator), M. Gerbaldi (France), A. Ubachukwu (Nigeria) and M.C. Pineda de Carias (Honduras) and then opened to general participation. The account given here has been prepared by the Editor from summaries provided by the four panellists, notes taken during the discussion and records of the questions and answers provided by the other participants.

Kochhar pointed out that astronomy is unique among modern scientific disciplines in the sense that it depends on international pooling of efforts. It is important to interpret the history of astronomy in the same spirit, that is, by emphasizing scientific content and continuity rather than the geographical and denominational compartments. By presenting astronomical developments through the ages as a cultural continuum, we will be emphasizing astronomy as a global heritage which must therefore be globally enriched and appreciated. The West must give up its fixation with ancient Greece. It should recognize that the Greek contributions had their antecedents and that time did not stand still between Ptolemy and Copernicus. On their part, cultures with memories of past contributions should use tradition as a source of inspiration and then selectively break away from it to enhance modern science.

Gerbaldi spoke of the need for organizing documentation for astronomy education. This point had come up several times (see, for example, p. 100). Particularly at school level there seemed to be a lack of documentation or, if it exists, people do not know where to find it. Perhaps a Centre should be set up to collect such documentation.

She emphasized the cultural differences in the ways of learning and teaching, that must be taken into consideration by those using the sort of documentation she had just described. Particular courses are always conceived for some specific environment, for teachers with prerequisites about the sort of activities they could undertake with their pupils.

Besides the Centre she proposed, and perhaps before it is set up, there should be a "tutorial service". Besides documentation, teachers need tuition or advice –but always as a dialogue with someone who has had face-to-face contact with pupils. These tutorials are needed to help in the acquisition of the necessary astronomical background, in the selection of the best documentation, and to provide a means of feedback from it, etc. Ways of learning are so different that

no one procedure will fit all situations; but there is a wide variety of experience on which to draw. Indeed, from Gerbaldi's point of view, there is no lack of documentation – she is flooded by it – but the opportunities for "lonely teachers" to have personal contact with tutors, who will share their experience and not just provide documentation, are severely limited.

Gerbaldi also drew attention to the many small telescopes around the world, with apertures less than 0.4 m or 0.5 m. How can we organize connections between them, in order to coordinate observations, to initiate observing programmes and to provide tutorials for the "lost observers" who could use them?

Ubachukwu stressed the problems of communication. There had been much talk at the Session on what to do with telephones, the Internet and libraries. There had been no talk on what to do without these. There is a danger in judging other developing countries by the experience of India. In Nigeria, they have to use their salaries to do any scientific work. There are no telescopes, no Internet (they have to pay for e-mail) and they can only receive faxes. There are no personal computers: they have to pay people to type, to analyze and to draw graphs. It takes a minimum of two years to get an article published. Ubachukwu still has not seen copies of his last two papers. They have to select journals that do not levy page charges, but they never see even them and cannot cite their own articles properly. There is no-one around to advise and criticize (compare the acknowledgments at the end of many Western papers!).

Recently, at the University of Nigeria, Nsukka, the National Space Research and Development Agency (NASRDA), formed in 1998, has established a Centre for Atmospheric Sciences and Astronomy (CASA) with Prof. P.N. Okeke as Director. NASRDA is improving commnuications among Nigerian scientists and sponsors meetings and workshops that motivate space scientists and increase the awareness of the relevance of space science and astronomy to national developments. The Astrophysics Group of the University of Nigeria has so far been largely self-supporting through international collaborations. The IAU has provided most of the travel grants and Jodrell Bank has provided us with preprints as astrophysical journals. The Group has never had any specific financial support either from the University or from the government. The establishment of CASA thus marks the beginning of funding by the Nigerian government for academic research in astronomy and will, undoubtedly, help to solve the long-standing problem that has crippled the development of astronomy in the country.

Pineda de Carias asked a question posed before in the Session (see p. 328) "What is a developing country?". Her answer: a country that needs help, that feels the need to raise its level. Independently of how one defines a developing country there is a common factor that defines the problem: we want our country or region to contribute significantly to the worldwide effort. How? There is not one recipe that suits all cases. One has to think about a strategy, to work out projects, to state policies. When you are the astronomer, the "lonely one" in a small country, you have to think what to do, how to do it and when to do it. But you need resources: money, equipment, staff, well-trained astronomers. How do you begin? We are all inhabitants of the same planet –the only inhabited planet we know; but language, culture and tradition separate us and present natural cores around which we can develop. We must transcend these divisions.

She supported Narlikar's concept of Third-World networking and agreed with Batten's suggestion of links between institutions: let us work out these ideas.

From the audience, Aguilar spoke of the problems that she faces in Peru. Although "how to learn science" is a worldwide problem, each country has its own specific difficulties. In Peru, the Faculty of Education emphasizes the methodology of education rather than the knowledge content of courses. The current globalization of industry leads to stress on production; basic science is seen as unnecessary by government officials. We have to use our imagination to convince them. People are concerned about the contamination of the environment by technology and we need to relate these concerns to astronomy. Astronomy is multidisciplinary and interdisciplinary.

Cooperation between countries is very important, especially within regions. Each Latin-American country is preoccupied with its own problems and they all forget that cooperation within the region would help them all, in a very short time. There is not enough interaction within the region.

There are educational reforms under way in Peru and two courses *Naturaleza y Ambiente* and *Ciencias de la Tierra* have been written from the point of view of astronomers. For the first time there is astronomy in the high-school curriculum –about one- third of a first-year course. Previously, astronomical topics were scattered in several different courses encountered by the students over a period of five years.

Taking up the theme of the relation between astronomy and environmental concerns, Crawford remarked that light pollution is a problem for all countries. He urged developing countries not to make the same mistake that the West has made. Light pollution is an issue with many social and environmental implications. Start campaigning in your own country now! Use the International Dark-Sky Association as a resource (www.darksky.org). (*Editor's note*: see also Schreuder's abstract, p. 364).

Martinez also stressed the need for cooperation between developed and developing countries: it is not taking place now at the right level. He spoke about the World Space Observatory (WSO), a concept that had emerged from the UN/ESA Workshops. The UN Committee on the Peaceful Uses of Outer Space was concerned with non-commercial and non-military uses of space for all humanity –i.e. astronomy. The mission concept is of an orbiting telescope outside the Earth's shadow and in a low-radiation zone. No new technology needs to be developed for it. Science Operations Centres on each continent (or even within each country), located in already existing space-science centres, could become mission-operations centres and provide personal- computer services. The WSO would promote cooperation between developed and developing countries and help to retain the best talent in each developing country. There are complex management issues and global cooperation is needed. He urged all those interested to contact himself or Willem Wamsteker.

Mattei commented that if the WSO were built there would be a need for workshops to educate those interested in using it. Such workshops should receive high priority because, without that sort of education, the satellite would not be used by astronomers from developing countries but by a few from developed countries. Adelman added that, although the WSO was a good idea, ground-based observatories could be provided much more cheaply. He drew attention

again to the availability of data-bases through the Internet. NASA has also put all its educational materials on the Web.

Much of the general discussion centred around the issues of education and networking. Rijsdijk felt that the IAU should form a Working Group for the development of educational resources which could be made available to organizations such as UNESCO, ICASE, ICSU, etc. Such a group could take cognizance of local culture and needs and make accurate information available. (*Editor's note*: Commission 46 already does much of this sort of work.) Ros also stressed the importance of contact between teachers in developing and developed countries. The European Summer Schools invite some participants from non-European countries (see p. 98) and those participants can organize courses in their own countries, based on what they have learned in the Summer School. She offered the opportunity to some teachers from developing countries to participate in the Summer Schools.

Bhatia voiced his support of Narlikar's scheme for networking, also supported by Pineda de Carias. He hoped that a request would go from this Session to the IAU to organize a group to develop the idea. Such a network could also help with education in astronomy, in schools, at higher levels and for the lay public. For example, it could identify groups of scientists able and willing to help and which could be approached by those wanting to use their services. Tancredi pointed to the example of networking given by the International Centre of Theoretical Physics in Trieste. It might be wise to ask them to broaden their interests to include research in astronomy and astrophysics.

Metaxa thanked Kochhar for his remarks about the Greek influence in astronomy but felt that this topic would be more appropriately discussed in Commission 41. Tancredi said that the IAU should be requested to encourage reflection of the diverse human cultures in the naming of celestial objects (e.g. minor planets) which, he believed, still had a strong tradition of using the names of Greek gods. Kozai pointed out that the discoverers of minor planets have the right to propose names for their own discoveries and many of them are quite happy to receive suggestions. Adelman agreed that it was important to be sensitive to the different cultures of the world and regretted that, in his opinion, few astronomers knew much about any culture other than their own. Chamcham felt that one should be cautious in making use of local traditions.

A few other isolated points were made. Adelman pointed out that many U.S. universities could donate equipment only if there was a cooperative agreement with the country concerned. Ratnatunga appealed to everyone with access to the Internet to publish on it so that they broadcast their results worldwide. Publication on the Internet is much less expensive than printing and can reach many more readers. Fierro commented that astronomers in developing countries need to spend time learning about fund-raising and how to encourage donations.