

Review



Whose Global Spatial Data Infrastructure?

GSDI-7 Conference Review

By Jacques Sipkes, contributing editor, GIM International

The availability of accurate spatial information is nowadays a must for a well-informed society. Spatial information datasets are vital for sound decision making at local, regional, state, central and global level, for planning and implementation. Natural resources management, flood mitigation, environmental monitoring, land-use planning – these are just a few examples of the use of spatial information. Prof. Ian Masser, President of the GSDI Association reminded the meeting in Bangalore that the GSDI ‘movement’ carrying as its aim the global spread of spatial information is just eight years old and has only six conferences behind it.

The Seventh International Global Spatial Data Infrastructure (GSDI-7) conference, held in the Indian city of Bangalore in the state of Karnataka from 2nd to 6th February 2004 had as its general theme ‘SDI For A Sustainable Future’. It brought together policymakers, academia, the industry and others to address regional, national and global initiatives and the spatial information requirements for these initiatives. There are widely varying states of readiness in relation to National Spatial Data Infrastructures. Some countries have a well-developed NSDI, other countries are in the process of developing one. Again, there is a group of countries that have neither embarked upon NSDI nor even show awareness of the need for one. All these differing NSDIs will at some point have to be reconciled to ultimately form the GlobalSDI.

By interaction of the various players and nationalities at gatherings like the GSDI-7 conference it is hoped that this end goal will come a bit closer to realisation. Countries at different stages of NSDI can learn from each other in respect of possibilities and constraints. GSDI does not envision the development of a master database or SDI for the world. The aim is to enable each nation to construct its own NSDI plan and further the awareness of SDI. During this GSDI-7 it was decided to institutionalise the GSDI ‘movement’ into a formal GSDI Association. The present conference was jointly organised by the GSDI Association, the Indian Space Research Organisation (ISRO) and the Central Government Indian Department of Science and Technology (DST).



The ESRI stand at the exhibition of GSDI-7: ESRI India CEO Mr Rajesh C. Mathur, Dr Carmelle J. Côté of ESRI USA and Dr Aniruddha Roy of ESRI India .

Opening Session

The chief minister of Karnataka State suggested basing the newly established GSDI Association secretariat in Bangalore. Prof. Ian Masser in his turn sketched achievements of GSDI since the first conference in Bonn, Germany in 1996 up until the GSDI-7. Present challenges to the GSDI were to get the establishment of the GSDI Association off the ground thus creating a sustainable organisation, and to ensure representation of GSDI Association members at various global forums.

Keynote Speakers

Dr Jack Dangermond, President of ESRI, in his keynote address reflected on the diverse interests of the delegates.

The question was how to connect diverse elements globally within the different institutions. GIS provided a process for integrating activities, as it connects the science side with the action side. GIS was helping us to organise the world through better efficiency, decision-making, understanding and communication. He also reflected on the mapping of declining natural resources. On the relationship of sustainable development to SDI, he stated that humans have for generations used abstractions with which to communicate: language, music, art, disciplines and maps. Geography and GIS were just such abstractions.



Prof. Ian Masser (right), President of the GSDI Association.



Dr Jack Dangermond President of ESRI during his keynote address.

Dr Dangermond saw five basic elements in these: maps and globes, geo-datasets, workflow models, data models and metadata. The present trend in GIS is that it is becoming more 'intelligent'. Meta-data would grow into a larger concept, from data on data to information on models. Web-servers provided the new platform for GIS; GIS portals would become integrated for the distribution of Web services. This was where interoperability became very important. The role of the GIS server was just emerging, according to Dangermond; GIS is evolving from simple GIS towards GIS networks. He envisaged new GIS functional



Prof. Yang Kai, President of the Chinese Society of Geodesy, Photogrammetry and Cartography.

capabilities, like 3D analysis, geoprocessing models, intelligent cartography, managing the time factor and GIS for mobile applications – all again demanding interoperability.

Other Speakers

Dr Mark Reichardt, Executive Director of the Outreach and Adoption Program of the Open GIS Consortium (OGC) explained the role of the 255-member strong OGC in promoting open and freely available standards in spatial information worldwide.

Dr Timothy W. Foresman of the USA gave a clear description of the history since 1998 of the Digital Earth movement and outlined future developments and initiatives (see web-site), the DERM-model and 3D geobrowsers. Prof. Fraser Taylor from Canada (see web-site) introduced the Global Map initiative and how this was linked and made operational with GSDI. The Global Map must be made 'bottom-up'; countries had themselves to validate their data for the Global Map concept.

Prof. Milan Konecny, President of the International Cartographic Association (ICA) highlighted aspects rather under-represented at this technically orientated conference, such as recommendations from the conferences of Stockholm, via Durban to the recent one in Geneva. He warned his audience not to forget the ethical aspects of SDI. The ICA President expressed the wish to co-operate with a number of initiatives and organisations in the SDI field.

The Representative of the Indian Space Research Organisation (ISRO) Dr P.S. Goel, Director ISRO Satellite Centre and member of the Indian Space Commission, delivered an interesting presentation on the ambitious Indian space programme. He mentioned satellites like EDUSAT linking pri-

The goals of the GSDI Association are to:

- Support the establishment and expansion of local, national and regional (multinational) spatial data infrastructures that are globally compatible
- Provide an organisation to foster international communication and collaborative efforts for advancing data infrastructure innovations
- Support interdisciplinary research and education activities that advance spatial data infrastructure concepts, theories and methods
- Enable better public policy and scientific decision-making through spatial data infrastructure advancements
- Promote the ethical use of and access to geographic information
- Foster spatial data infrastructure developments in support of important worldwide needs such as improving local to national economic competitiveness, addressing local to global environmental quality and change, increasing efficiency, effectiveness and equality at all levels of government and advancing the health, safety and social wellbeing of humankind of all nations

mary, secondary and tertiary educational institutions with high-capacity Internet connections, telemedicine via satellites linking islands in the Indian Ocean with medical facilities on the mainland, the IRS remote sensing satellite series and information on CARTOSAT-I.

Regional SDI Initiatives

A number of regional SDI initiatives were addressed during pre-conference workshops. These included the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP), the European Umbrella Organisation for Geographic Information (EUROGI), The Economic Commission for Africa Committee on Development Information (CODI), the Permanent Committee on Geo-spatial Data Infrastructure for the Americas (PCIDEA) and the Scientific Committee on Antarctic Research (SCAR). Mr Basante Raj Shrestha of the International Centre for Integrated Mountain Development for the Hindu Kush-Himalaya Region (ICIMOD) also gave a presentation.

Exhibition

Twenty-eight agencies and organisations were represented at the accompanying Spatial World Expo, both private and public and originating from India and abroad. A wide variety of high-tech spatial information solutions could be seen on the stands. Partly as a result of it being rather far distant from the main conference venue, the number of visitors to the exhibition proved a bit meagre.

The next conference in this series, GSDI-8 will be held in Cairo, Egypt from 16th to 21st April 2005.



Keynote speakers awaiting their turn to address the audience.

Web-sites

www.gsdiassociation.org
www.24framesdigital.com/gsd7/video.html
www.iscgm.org/html4/index.html
www.digitalearth.gov
www.gsi.go.jp/PCGIAP/main.html
www.icimod.org.np/index.html
www.globalmarshallplan.org
<http://earthportal.net/EIC/>

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Article



Online Master Degree Programme

Remote Sensing and GIS Education in Turkey

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There is a rapidly increasing demand for professionals with a background in Remote Sensing and GIS, a development that has forced many universities all over the world to restructure their courses and programmes and to introduce new undergraduate and graduate programmes. In Turkey and many Middle Eastern Countries there exists an acute shortage of Remote Sensing and GIS experts. The authors discuss this alongside the development of an online education programme for reducing the undersized pool of professionals.

The wealth held by developed countries today depends on the information they have rather than on the natural resources they own. However, it is not sufficient to own this information, it has also to be properly managed. The geographical/location component of most data is essential



Computer-aided Web-based training is more effective than traditional methods because students do not need to go to classrooms.

for many applications. Today, Remote Sensing (RS) and Geographical Information Systems (GIS) provide the appropriate technology and tools for collection, management and use of geo-data. In urban planning, for example, RS and GIS techniques enable evaluation of the current status of urban objects like buildings, streets, parks, government buildings and military areas. Plans can be properly made and adjusted when needed, resulting in savings of both time and money. RS and GIS are also essential basics for Disaster Information Systems, which support rescue teams and save lives. These techniques are also widely used in geology, environmental engineering, architecture, city and regional planning, surveying, aviation and military applications. They support mapping of erosion risks and earthquake risk maps.

Lack of GIS Experts

Over the coming five to ten years, RS and GIS techniques will be essential for all government agencies and municipalities in Turkey. The main factor, however, remains manpower, because it is people who must manage these systems. Unfortunately, in Turkey as in most other Middle Eastern Countries, most hardware and software are not properly used due to a lack of adequately educated professionals. This results in inappropriate and unproductive results and in misuse of technologies. Many departments today depend on consulting companies to establish their GIS, existent in-house training being inadequate for learning how to handle and maintain a GIS project. Not having enough staff involved from the beginning of a GIS project may also contribute to its failure. It also often happens that staff once trained in-house, migrate to other branches of government departments or to the private sector. It

Anadolu University

Anadolu University has twelve faculties, three of which offer distance education; seven faculties offer degree programmes and four associate degrees. Anadolu University has in addition nine institutes and twenty research-centres. With approximately 700,000 students, it is the largest university in Turkey and one of the largest in the world. Established over forty years ago, it has become one of the pre-eminent institutions of higher education in Turkey, accepting responsibility to excel in service to the community and willing to follow scientific, academic and technological innovations and meet universal standards.

The university, committed to excellence in research, has accomplished 'firsts' within the Turkish Higher Education system and produced solutions to 'problems in education'. Today it combines all the essential components of a great and engaged university, worthy of the young Turkish Republic. The University aims to prepare students for lives of leadership and service in a constantly changing world. Students find it a place where challenging courses offering strong academic majors help them to develop the tools they need for success.

is thus of essential importance to provide high-quality education at university level to create a base of knowledgeable and experienced professionals.

Graduate Programmes

GIS courses are being developed in both undergraduate and graduate programmes at universities in Turkey, in particular by departments of geodesy, cartography, computer sciences, geology and photogrammetry. Graduate schools of natural and applied science have developed GIS-based programmes and there are two graduate programmes in RS and GIS Technologies. One of these, the Geodetic and Geographic Information Technologies programme, was developed by Middle East Technical University and consists of three streams:

- Space Geodesy
- Remote Sensing and
- Geographic Information Systems

Departments that have contributed to this programme are those of City and Regional Planning, Civil Engineering, Computer Engineering, Electrical Engineering, Environmental Engineering and Geological Engineering.

The other graduate programme has been developed by the Research Institute of Satellite and Space Sciences of Anadolu University (see text box for background to this university). This RS and GIS programme will begin this academic year under the supervision of the Graduate School of Sciences.

The following departments have contributed to the programme: the Research Institute of Satellite and Space Sciences, the Faculty of Engineering and Architecture, the Department of Architecture, the Faculty of Engineering and Architecture, the Department of Material Science and Engineering, the Faculty of Engineering and Architecture, the Department of Environmental Engineering, the School of Civil Aviation, the School of Industrial Arts, the Faculty of Natural and Applied Sciences, the Department of Statistics, the Faculty of Natural and Applied Sciences and the Department of Mathematics.

A dual target-group is envisaged:

- Graduates from science and engineering departments who intend to continue their studies; a postgraduate programme with thesis is suggested for this group
- Practitioners in the public and private sector who want to enlarge their knowledge and skills; a graduate programme without thesis is suggested

Table 1 lists the courses. Students are obliged to take part in at least three courses in addition to the seminary.

Online Programme

The Anadolu University RS and GIS masters programme will be executed online. The university has much experience with distance education using Internet capabilities; both asynchronous and synchronised training will be per-

Masters Degree Courses

- Remote Sensing
- Geographical Information Systems
- Computer-based Design Applications and Automatic Mapping/ Facility Management (AM/FM) Systems
- Database Management Systems and General Concepts (geodatabase)
- Integration of Global Positioning Systems (GPS) and Geographical Information Systems (GIS)
- Digital Analysis Methods
- Fundamentals of Cartography
- Interpretation and Analysis Techniques in GIS
- Statistics/Geostatistics
- Computer Programming
- Remote Sensing and Geographical Information Systems in Disaster Management
- GIS For Disaster Management
- Urban Information Systems
- Environmental Management and Geographical Information Systems Integration
- Electromagnetic Wave Theory in Remote Sensing
- Material Science for Remote Sensing
- Thesis
- Seminary

formed. Computer-aided Web-based training is more effective than traditional methods, especially for graduate courses, because students can participate in courses without going to classrooms. This avoids lost time - important for those who combine study and job. Online courses are also very useful for academicians; material is easily accessible and supported by animations and illustrations. Very successful examples of Web-based GIS training and education are the ESRI Virtual World Campus and Penn State GIS Online Master Degree Course. Moreover, an Internet-based online training programme provides an infrastructure for co-operation and the establishment of information-sharing mechanisms between private sector, government departments and universities.

Courses for the Anadolu University RS and GIS master programme will be fully independent of place and time and conducted entirely via the Internet. The programme will initially be carried out in the Turkish language. In a second stage English will become the main language, enabling foreign students, mainly from Middle Eastern Countries, to be enrolled for the programme. For more information on GIS and GIS education in Middle Eastern Countries readers are referred to the web-sites.

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Further Reading

- Ayday, C., 2003, Proposal for RS and GIS Education in Anadolu University, Eskişehir
- Çabuk, A., Ahern, J., 2000. GIS Education for Planners Using Hypothetical Models, ESRI European, African and Middle Eastern User Conference, Istanbul
- Çabuk, A., 2003. Integration Plans and Basemaps, GIM International, Volume 17, 3
- Yagoub, M. M. Geographic Information Systems (GIS) Education and Application in the United Arab Emirates

Web-sites

- www.angelfire.com/mo/yagoub/images/GIS_UAE.htm
- www.anadolu.edu.tr/index_eng.html
- www.ggit.metu.edu.tr

Biography of the Authors

Assistant Prof. Dr Alper Çabuk holds master degrees in Landscape Planning and Environmental Management and a PhD in Environmental Economics, having completed his postdoctoral study in the USA. He has been involved in international remote sensing and GIS projects for more than ten years in the USA, Turkey and some Middle Eastern countries and he is one of the founders of the RS and GIS Masters Degree programme at Anadolu University. He is author of three books and many papers.

Prof. Dr Can Ayday has been involved in earth science, remote sensing and GIS projects for more than ten years. He leads development of the RS and GIS Masters Degree programme at Anadolu University and currently heads Anadolu University Research Institute of Space and Satellite Science.

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