# Seventh United Nations Regional Cartographic Conference for the Americas

**New York, 22-26 January 2001**

**Report of the Conference**

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*Note*

Symbols of United Nations documents are composed of capital letters combined with figures.

The proceedings of the Seventh United Nations Regional Cartographic Conference for the Americas, held in New York from 22 to 26 January 2001, are being issued in one volume as the report of the Conference.

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# Contents

# I. Organization of the Conference

## A. Terms of reference

1. The Seventh United Nations Regional Cartographic Conference for the Americas was held at United Nations Headquarters from 22 to 26 January 2001. The Conference was held in accordance with Economic and Social Council decision 1997/292 of 23 July 1997.

## B. Opening of the Conference

2. On behalf of the Office of the Director of the Statistics Division, Department of Economic and Social Affairs of the United Nations Secretariat, the Conference was opened and the participants welcomed.

3. An opening statement was made citing the importance of the Conference and noting some of the accomplishments since the Sixth Conference, especially in reference to the resolutions of that Conference. The remarks concentrated on geographic information systems (GIS), noting specific and key trends in the Americas. Three such trends were highlighted. Information and communication technology on a global basis had improved dramatically. That drove the creation of new business fostering interactivity and linkage, which required cooperation on a global level. Much of what had been accomplished was related to the continued evolution and development of the Internet. The information revolution was a major factor in focusing need and fostering development in geographical information. Eighty per cent of all information was in some way related to geography, and its application was growing in many sectors, of which transportation, marketing, and environmental analysis were but a few. Clearly, the application was moving from research and marketing to decision-making, which was time consuming and therefore necessitated the sharing and integration of "core" data.

4. The concept and realization of the value of spatial data infrastructure (SDI) was increasing. There was increasing facilitation of access to a wide range of data, and the challenge was how to harness the capability. The barriers were not related to technology but, in order to restructure and focus on standards, various national mapping programmes would be required. The United Nations realized the critical nature of the emerging requirements and was responding to the need by developing a global geographical database. In 2000, various Governments in the Americas, in collaboration, created the Permanent Committee on Spatial Data Infrastructure of the Americas. Part of the purpose of the Conference would be to determine the nature of the will to make it succeed and to cultivate the means. Problems must be identified and solutions developed.

## C. Attendance

5. The Conference was attended by 136 representatives of 34 countries, 4 specialized agencies, and 13 intergovernmental and international scientific organizations and by 14 invited speakers. The list of participants appears as annex I to the present report.

## D. Election of officers

6. At its 1st plenary meeting, on 22 January 2001, the Conference elected the following officers by acclamation:

*President*:
Mr. Antonio Puig (Mexico)

*Vice-Presidents*:
Mr. Santiago Borrero (Colombia)
Mr. Denis Fuentes (Panama)

*Rapporteur*:
Mr. Roger L. Payne (United States of America)

## E. Adoption of the rules of procedure

7. At its 1st plenary meeting, the Conference adopted its rules of procedure, as contained in document E/CONF.93/2.

## F. Adoption of the agenda

8. At its 1st plenary meeting, the Conference adopted its provisional agenda, as contained in document E/CONF.93/1. The agenda was as follows:

1. Opening of the Conference.
2. Election of the President and other officers of the Conference.

3. Objectives of the Conference.

4. Organizational matters:

   (a) Adoption of the rules of procedure;

   (b) Adoption of the agenda;

   (c) Establishment of committees and election of the Chairman and Rapporteurs;

   (d) Organization of work;

   (e) Credentials of representatives to the Conference.

5. Country reports.

6. Reports on the implementation of resolutions adopted at the Sixth United Nations Regional Cartographic Conference for the Americas.

7. Reports on achievements in surveying, mapping, and charting in addressing national, subregional, regional, and global issues, including:

   (a) Policy and institutional issues;

   (b) Technical issues;

   (c) Applications.

8. Review of the achievements of the Conference.

9. Provisional agenda for the Eighth United Nations Regional Cartographic Conference for the Americas.

10. Adoption of resolutions and the report of the Seventh United Nations Regional Cartographic Conference for the Americas.

## G. Objectives of the Conference

9. The objectives of the Conference were defined and presented by the Secretariat. They include, among others, the exchange and fostering of ideas and information in cartography and geographical information, especially for problem-solving. There would be a focus on information and data exchange, training, and scientific requirements, with special attention to the development of SDI at all levels. The Conference would also evaluate the resolutions of the Sixth Conference and discuss the various and relevant developments since that Conference.

## H. Organization of work

10. At its 1st plenary meeting, the Conference adopted the organization of work as proposed by the Secretariat.

## I. Establishment of technical committees

11. At its 1st plenary meeting, the Conference established the following three technical committees, each with a Chairman and a Rapporteur:

Committee I:
Development Needs and Institutional Capacity-Building

*Chairman*:
Mr. Richard Groot

*Rapporteur*:
Ms. Carmen Reyes

Committee II:
Fundamental Data Collection and Management

*Chairman*:
Ms. Guadalupe Lopez

*Rapporteur*:
Mr. Luiz Paulo Fortes

Committee III:
Spatial Data Infrastructure Development in the Americas

*Chairman*:
Mr. John Moeller

*Rapporteur*:
Mr. Dietmar Gruenreich

## J. Documentation

12. A list of the documents submitted to the Conference appears as annex II to the present report.

## K. Credentials

13. At the 7th meeting, on 26 January, the Acting President of the Conference, Vice-President Mr. Santiago Borrero (Colombia), reported that the Credentials Committee had reviewed all credentials and found them to be in order.

## L. Provisional agenda for the Eighth United Nations Regional Cartographic Conference for the Americas

14. At its 7th meeting, the Conference approved a draft provisional agenda for the Eighth United Nations Regional Cartographic Conference for the Americas, which is to be held for five days no later than early 2005. The provisional agenda was contained in annex III to the present report.

## M. Closing of the Conference

15. At its 7th meeting, the Conference adopted ten draft resolutions and its draft report (for the text of the resolutions, see chap. VI).

# II. Plenary meetings

16. The papers representing the various country reports were noted by reference number for the participants to review at a later time.

17. The President of the Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA) presented a paper, prepared by the United Nations Secretariat and PC-IDEA, which reviewed the status of the resolutions of the Sixth Conference:

(a) Resolution 1. Seventh United Nations Regional Cartographic Conference for the Americas. The resolution was being implemented by virtue of the Conference being in session;

(b) Resolution 2. Establishment of a working group of delegates and experts to define the mission and focus of the Seventh United Nations Regional Cartographic Conference for the Americas. A meeting was held in Aguacalientes, Mexico, where two recommendations were formulated: creation of a United Nations Geographic Information Commission; and revitalization of the United Nations Regional Cartographic Conferences. Budgeting limitation prevented creation of the Commission, but the Conferences were being revitalized, as evidenced by the current Conference;

(c) Resolution 3. Permanent Committee on GIS Infrastructure for the Americas. The Committee was established in Bogota, Colombia, on 29 February 2000;

(d) Resolution 4. Spatial data infrastructure. A letter has been sent by the Secretariat to all Member States stressing the importance of participation in the Global Map Project;

(e) Resolution 5. The role of the cadastre in spatial data infrastructure. There exists a technical working group to assess the issues. It will follow the recommendations of the Bathurst Declaration (Australia 1999), adopted by the United Nations and the International Federation of Surveyors;

(f) Resolution 6. Development of the Global Map. Participation at the Global Map Forum (Japan 2000) was noted, but there were still some countries evaluating the project or not participating;

(g) Resolution 7. Enabling technologies. There was no specific action to report;

(h) Resolution 8. Inter-American Biodiversity Information Network. Work was being carried on directly with member States, especially the United States Federal Geographic Data Committee (FGDC);

(i) Resolution 9. Regional workshops and seminars on the benefits of advanced satellite imaging systems. There was no action to report.

18. Agenda item 7 was initiated by a presentation from the United States of America, entitled "National mapping organizations in a changing world" in which numerous factors and conditions that affected and would determine the continued evolution, composition, and development of national mapping organizations were highlighted. Of course, the process and direction would be based upon national philosophies and needs. Accurate and relevant maps were needed in order to make sound policy regarding economic development and other requirements. The world was rapidly changing, especially in terms of population and demographics, the environment, and technology. Various examples of each of those broad categories were presented and considered in light of cartographic requirements and applications.

19. There was an explanation of the evolution from simple geographic information systems (GIS) to geographic modelling systems (GMS) on the use of statistics. It noted that mathematical and statistical technology and modelling would lead to intelligent mapping and other new innovations and developments. There were new techniques of remote sensing, and the emerging new understanding of Earth and societal processes was expanding and improving mapping activity. Improved management techniques were assisting the mapping process as well. Clearly, the full range of benefits of mapping was far greater than the cost of producing maps. The virtual processing of databases by uniformed users would soon be possible, but smart processing and intelligent searches would function for the user. There would also be real-time monitoring, and sophisticated analytical engines. New maps would include incorporated models. Interdependability and standards were critical aspects of a national spatial data infrastructure (NSDI) and a global spatial data infrastructure (GSDI). Metadata were also essential in the cartographic user environment.

20. National mapping organizations must become more aware of applications, and therefore make techniques of production more relevant. Increased demand and competition might constitute a threat to national mapping organizations unless partnering was developed. There were many options that might apply, including production migration, commercialization, and privatization. The third option might require licensing agreements and create certain barriers to data use. It was important to note that responsibilities of national mapping organizations had not changed: they were to make maps available, accessible, and applicable. Much mapping work was contracted, and some organizations had even become contractors. There must be a way to ensure open access to data and maps. Partnerships were now both horizontal and vertical — that is, they included local, state, and regional partnerships, with varying degrees of success. Achieving success would require standardizing, being adaptable, constant re-evaluation of user requirements, and providing knowledge.

21. There were numerous responses, indicating the relevance and insight of the presentation. The delegate from Panama noted that the Conference participants had a clear grasp of the situation and that national mapping organizations clearly needed to reform. The delegate from Netherlands expressed concern over the loss of control of the data by contracting or privatization. Regardless of the degree of commercialization or privatization, national mapping organizations must maintain control of the data, especially with regard to accuracy and quality assurance. The delegate from Germany inquired about the "large scale sector". Some urban areas were producing high quality data on a large scale basis, but data from less affluent areas (at that time) were not as good. The delegate from Finland wondered how smaller countries might retain access to their data if fully privatized, given the global aspect of business organizations. There seemed to be no readily available answer to that dilemma. The delegate from Germany asked how the national mapping organizations and framework development were related. It was generally agreed that national mapping organizations must lead the way in framework development for NSDI. The International Cartographic Association representative asked how the data, if privatized, were maintained. That may be a problem in some countries, but in the United States all data processed and managed by the federal government were freely available to all.

22. A presentation was made by a representative of the Global Spatial Data Infrastructure Steering Committee, from the United States, on the development of a global spatial data infrastructure (GSDI). The presentation contained a wealth of information regarding the issues, and procedures for development were noted. It was pointed out that GSDI was actually a response to complex community issues, and led to effective business practices. It represented a coordinated approach to access and application of geospatial data. A survey in 1998 found at least 30 nations developing or implementing a national spatial data infrastructure (NSDI). In 2000, the survey had been extended to include an analysis of NSDI development. There were various components, including geospatial data, technology, standards, an organizational framework, and resources and partnerships. It was very important that NSDI development be from local to regional to national, and ultimately global. Examples in the United States were described in terms of growth, quality, and progress. The framework was discussed, including components such as anthropology, transportation, hydrography, geodesy, cadastre, geographical names etc.

23. It was noted that metadata were crucial, providing an important clearing house or catalogue. Standards were critical in NSDI development as were the fostering of partnerships for the coordination of resource management and data integration. In addition to the local, regional, national model, it was encouraging to note the development of super-regional SDIs, in Europe, Asia and the Pacific, and now the Americas.

24. At the Second GSDI Conference, in 1997, a mission statement had been presented. At the Fifth Conference, scheduled for Cartagena, Colombia, in May 2001, the emphasis would be on outreach and the importance of national strategy and decision-making. Technical development increased and enhanced SDI development through open GIS processing on a Web-based catalogue service. There were over 200 clearing house sites throughout the Americas. The forecast was for SDI to continue to grow along with the development and implementation of guidelines, more permanent committees, and growth of existing open processing in a virtual Web-based environment.

25. In the analysis of the paper it was observed that the homogeneity and seamless aspects of future requirements necessitated the successful establishment of SDI with comprehensive knowledge of organizational structures, technological developments, and data collection methods. It had become generally accepted that spatial information affected about 80 per cent of human decision-making and was as indispensable as a resource as employees, funds etc. Clearly, spatial data served a variety of applications and spatial information management had become very important, in both developed and developing countries and in those in transition.

26. SDI was an "umbrella" of policies, standards, and procedures under which an organization and technologies interacted to foster more efficient use, management, and production of spatial data. Development of an NSDI required cooperation and skills used for conflict resolution. NSDIs would have different requirements, depending upon a country's needs, and in fact, must be flexible to adjust to changing needs. A major aspect of NSDI development was the ability to integrate the data successfully. Training in the use and analysis application of NSDI information was critical to its success, but training had been expensive and logistically problematic. New technology allowing long distance participation would alleviate some of those issues so that developing countries could receive training in a more timely manner. The use of the Internet was playing a major role in training and technology development. The various aspects of spatial data integration and some examples of technology developments were presented. Specific examples included the Shuttle Radar Topography Mission. Global positioning system (GPS) technology was discussed, along with potential future development, and it was noted that the removal of selective availability was a major milestone. Methods of data collection must evolve and become more efficient and must become more sensitive to cultural heritage and environmental issues.

27. The International Federation of Surveyors (FIG) presented a paper on the relationship between land administration, spatial data infrastructures, and sustainable development, making a strong case that current schemes for land administration were rooted in a centuries-old model of land marketing and private ownership and were non-supportive of current national and regional needs for spatial data management. The Conference noted that the development of land administration systems had always been dynamic and reflective of society's interaction with the land at different periods of time. Current global drivers of change such as growing urbanization, globalization of economies, developing technologies, along with environmental pressures such as unsustainable land use patterns, all pointed towards the need for future multipurpose cadastre systems and a renewal of land administration thinking. Effective and successful efforts at sustainable development would require a more complex decision-making process. Suggested recommendations discussed by the Conference included support of the United Nations-FIG Bathurst Declaration, calling for a national vision embracing land administration, cadastre, the environment, and sustainable development in the context of a spatial data infrastructure. The Conference noted that transition to new schemes of land administration was straightforward only in countries that already possessed stable economies and that supportive land administration schemes were more the product of sustainable development rather than its driver.

28. The Cartographic Section of the United Nations Secretariat delivered a presentation covering ongoing and emerging programmes within the United Nations to coordinate internal and operational geographic

information requirements and to define a concept of a United Nations geographic database. The United Nations reported that numerous organizations and agencies within the United Nations were active users of many types of geographic information obtained from diverse sources. The information supported a broad range of United Nations activities, including humanitarian relief assistance, peacekeeping operations, conflict resolution, and development programmes. A need had been identified to coordinate those various activities to eliminate duplication of collection and analysis of data. As a result, the United Nations Geographic Information Working Group had been established in 2000, with the ultimate objective of defining a strategic plan for the United Nations in meeting its global geographic information needs. Related to the work of the Working Group was a proposal to create a United Nations geographic database, a sustainable and maintainable seamless database of framework spatial themes. Creation of the database would necessarily be contingent on the United Nations working closely with national mapping authorities to obtain authoritative framework data sets that could be shared over a distributed network.

29. The importance of standard geographic nomenclature as a fundamental data layer in spatial data infrastructures was presented in another paper. Though names of places were largely taken for granted, it was considered crucial for policy makers and spatial data planners to recognize the fundamental utility of a national toponymic register in ensuring the unambiguous reference to places in human terms and in ensuring the preservation of the invaluable cultural record of human interaction with the landscape that geographic names represented. The presentation summarized the activities of the United Nations Group of Experts on Geographical Names and the United Nations Conferences on the Standardization of Geographical Names. It was recommended that the principles espoused by the Group of Experts could be usefully injected into the design of national and regional spatial data infrastructures, with provision for national geographic names standardization, development of national toponymic guidelines, and the creation of national toponymic databases, registers, and gazetteers.

30. The delegate from Colombia reported on the creation, development and activities of PC-IDEA, which was a direct result of resolutions proposed at the Sixth Conference. A three-year process had been required to establish PC-IDEA, with important contributions made by the Pan-American Institute of Geography and History (PAIGH), the Directorate of National Mapping Institutions in South America, Spain and Portugal (DIGSA), and the Inter-American Geospatial Data Network Initiative (IGDN). It was fully operational, with a stated vision, meeting schedule, and working groups. In spite of the progress made since 1997, not all of the concepts relating to spatial data infrastructures had been clearly defined and understood. It was noted that a gap between spatial data specialists and policy makers existed, and the gap would need to be bridged in order to help guarantee the required level of budgetary support to national mapping authorities. A successful spatial data infrastructure, with due attention paid to the current quality of data layers at the national level, required reliable budgets for national mapping organizations. Additionally, within the Americas region, greater attention needed to be paid to the development and implementation of standards for spatial data, to ensure that data were understood and accessible, structured and well documented. Suggested recommendations discussed included strengthening the positions of national mapping authorities, implementing educational and training programmes to improve the human capacity to exploit technology, continuing the re-engineering of the United Nations regional cartographic conferences, inventorying global data sets and initiatives, and promoting pilot projects and efforts at harmonization and cooperation.

31. The delegate from Brazil presented a summary of the progress made in the development of SIRGAS, the South American Geodetic Reference System. SIRGAS grew out of a situation in which numerous countries in the Americas had over time adopted, for national use a number of various horizontal and vertical geodetic reference systems, making the interrelationship of spatial data produced by different countries extremely difficult. The various systems, developed by classical geodetic methods, also possessed certain inaccuracies in comparison with the more up-to-date systems based on GPS techniques. The initial objectives of SIRGAS were the development of a highly accurate geodetic network covering South America, the definition of a single geocentric datum, and the definition of a South American geodetic reference system. Work on these objectives was essentially completed by 1997, after which work began on the definition of a common

vertical reference system for the region, including North America and the Caribbean. Results on that aspect of the project were to be reported in February 2001. The SIRGAS project was an excellent example of regional and international collaboration to elaborate a solution to a highly complex spatial data problem.

32. The delegate from Japan reported on the activity of the Permanent Committee on Geographic Information for the Asia Pacific region (PCGIAP) and the 15th United Nations Regional Cartographic Conference for Asia and the Pacific, held in April 2000 in Malaysia. PCGIAP was described as similar in concept to PC-IDEA. It had first met in 1995, with membership drawn from the directorates of the 55 national mapping organizations in the region. Meetings had been held annually since that time. The Fifteenth Regional Conference had been essentially a collaborative arrangement with PCGIAP, with an emphasis on invited papers from experts. At the meeting, new PCGIAP working groups were founded to address regional geodesy, fundamental data, cadastre, and institutional strengthening.

33. The International Society for Photogrammetry and Remote Sensing (ISPRS) submitted a paper on developments within the Society. There was a short introduction defining and explaining the nature of the Society, followed by an explanation of some key terms and definitions. It was noted that there was an ever-increasing demand for digital data, thereby increasing automation in information extraction especially for terrain elevation data and digital orthophotos. There was a general discussion focusing on satellite data, with special attention to spatial (30-metre) and spectral (multispectral) high-resolution data as well as highly temporal data, with a very low resolution, of 1-4 kilometres. The choice would depend upon the application. Resolution of 1 metre, a goal at the very large scale of 1:2,400, should be achieved in about five years. Airborne systems were still being used and would continue to be used, but the traditional existing film-based systems would be replaced by a digital system. Also, there was increasing demand for more accurate elevation determination for GIS application. Recently, the Terrain Laser Scanning System had been implemented for elevation determination. There was a substantial need to develop standards for both image and vector data. There were advantages and disadvantages to digital data collection. The advantages included new technology and technology that enabled other techniques in computer activities. The disadvantages were the cost of hardware and creating high-resolution data and the cost and logistics of training. Issues adversely affecting developing countries included training, technology transfers, maintenance and upgrading of equipment, and lack of assistance in taking advantage of rapidly developing conditions.

34. The International Cartographic Association (ICA) presented a paper entitled "Cartographic developments and challenges for dissemination of geospatial data". The mission statement of ICA was presented, and it was noted that ICA was the world authority for cartography. The paper stated that there were many reasons for the existence of ICA, but particular attention was drawn to solving worldwide problems through maps and the promotion of the use of professional and technical standards. A General Assembly and a Technical Conference met every four years. There were 82 member States. A short history of cartography from ancient times to the present was given. Maps were the common interface with numerous systems, and cartography was the tool with which to create critical realities. There would likely be an increase of scanning older maps for data capture and current application. Developments in cartography would support the further development of SDI at the global, national, and local levels. In the discussion that followed, technology and storage, communication, standards, and new methodology were considered. There was a detailed discussion of creating geospatial databases and the classification of those data spatially into geometry and topology with descriptive data classified by attributes and functions. There was then a discussion of requirements and modelling, focusing on the conceptual model and the entity model. Further discussion included the application model, database specification and design as well as maintenance and management. There was then a review of framework requirements and metadata, highlighting feature classes as well as administrative boundaries, infrastructure, settlements, land use, hydrology, relief, and geographical names.

35. The International Standards Organization (ISO/TC 211) presented a paper entitled "Spatial standards as a basis for a sustainable geospatial data infrastructure". ISO was an independent body headquartered in Geneva, and was comprised of approximately 3,000 committees and subcommittees

with more than 30,000 experts working to develop standards. ISO/TC 211, Geographic Information/ Geomatics, has had about 500 participants in its six-year history. The paper noted that standards should be in response to the market. There were many different views of an NSDI because of the varying needs of any given country developing it. The GSDI initiative had identified many of the requirements and was methodologically adding States and regions to achieve its goal. Interoperability was the ability of a system to provide information-sharing and inter-application. Standardizing geographic data was best achieved by integration of geographic information concepts with the concept of information technology. One goal was to facilitate interoperability of geographic information systems. Standards were documented agreements containing technical specifications consistently used as rules, guidelines, or definitions. There were segments representing spatial data: GIS — traditional geographic information system; BSS — business support system; and PP — personal productivity, or, more specifically, LBMS — location-based mobile services. GIS had stabilized, while BSS and especially LBMS were rapidly increasing activity. It was predicted that location-based services would soon become the second most desired and used aspect of communication. There was now a steering committee with five working groups plus other miscellaneous activities. The working groups were: Framework Geospatial Modelling, Geospatial Data Administration, Geospatial Data Services and Functional Standards. The scope was wide, covering every aspect of geographic data. The goal was not necessarily to develop standards but to link to existing, approved standards. There were numerous liaison activities with other organizations. The goal was to support understanding of the use of geographic information; increase availability access, integration and sharing of geographic information, and assist in the establishment of geospatial infrastructure on the local, regional and global levels.

36. The International Institute for Aerospace Survey and Earth Sciences (ITC) presented a paper entitled "Economic issues in the evolution of national geospatial data infrastructure". It addressed one of many possible economies regarding efficient pricing and how it affected a national mapping agency (NMA). Generally, NMAs had strong convictions regarding their products, yet they must demonstrate economic solvency. There was a paradox whereby it seemed less than feasible to establish economic quantification in relation to established policy of geospatial data. Geospatial data and mapping were a political and economic investment, so what were the requirements for economic efficiency? Traditionally, the Government provided development of infrastructure, and so, how could the activity be quantified? It was generally accepted that data should be quantified, efficient, timely, reliable, and up-to-date. According to the paper and the model presented, the goal was to work ultimately towards a zero subsidy — that is, self-sufficiency without direct funding. In the past, mapping had included positioning systems, topographic maps, administrative boundaries, and geographical names. Now, one must add GPS, digital elevation models (DEM) and topographic template or specific mapping requested by the user. Specifically, there must be relevance to the NSDI.

37. An NMA must meet the goals of a "national monopoly" or, more specifically, be able to generate and produce maps more cheaply than any competition or any combination of activities. Users were often seeking not necessarily a traditional topographic map but some layer of framework (topographic template). The economic intake must not be negative. When the framework for management was in place, then commercialization and/or privatization can be discussed. Many agreed that complete and total privatization was contrary to the Government's strategic role. There could be a franchise or concession, but that was, on the whole, a poor choice. A management contract was a possibility, since a negotiated contract on the part of the Government was possible. It was generally agreed that technical development would continue to place higher demands on the NMA. The question was how could quantified access to the data be offered in the most efficient way.

38. The World Bank presented a paper entitled "Spatial data infrastructure and development: the World Bank Approach". It discussed what SDI meant for the World Bank and why it was important. At the Bank, there was more than one acceptable approach to establishing an SDI. Typical data in a World Bank SDI were geodetic framework; topography; hydrology; administrative boundaries; geographical names; cadastre; and land tenure, value and areas. Data were provided by public agencies, local governments, and private stakeholders. SDIs were important at the Bank as a key in decision-making, sound land-based policy, supporting economic development, encouraging

socially and environmentally sustainable development, and as a key component of many projects. There had been numerous projects throughout Central America, and the specific land administrative project in El Salvador was highlighted. The objectives had included registering all properties, urban and rural, private and public. Also, the land registry was strengthened, and the national cadastre and mapping agency was expected to keep the information updated and to self-finance the maintenance. The project realized complete large-scale mapping at 1:1,000-scale urban maps and 1:5,000-scale maps for the entire country, in a digital format. There was 1-metre accuracy in rural areas, and 50-centimetre accuracy in the urban cadastral survey for the entire country; and there was a new national geodetic network. There was also partnership with municipalities for data maintenance. An economic study would be carried out to evaluate the economic value and utility of SDIs, and showing SDI as a key part of infrastructure for economic development. Afterwards, there should be partnership development between the World Bank and other parties interested in SDI, including the United Nations and the Permanent Committee on SDI for the Americas.

39. The United Kingdom presented a paper on development needs and capacity-building in support of spatial data infrastructure creation and maintenance. Basic forces for change in the current environment were considered, including the new economy, new geographic communities represented by cyber-communities, technological developments and increasing amounts of available geospatial data. In the United Kingdom it was reported that the value of geospatial information in terms of its contribution to the general economy was on the order of 100M British pounds, underscoring its role as the underpinning of many key economic sectors. In the case of developing countries, the need for geospatial information was clear in support of numerous national and community-based activities. For a national SDI to succeed, a number of pre-existing factors needed to be in place, including national political stability, understanding on the part of leadership of the value of spatial data, an operative base infrastructure, the ability to begin the construction of large-scale databases, and the means for education and training. It was emphasized that investment in base or fundamental data was crucial, and that the increased use of spatial data in numerous sectors was a driving force in many economies.

40. The United States of America conducted a presentation describing the role of the National Imagery and Mapping Agency (NIMA) in providing technical support to the peace negotiations between Ecuador and Peru in the 1990s. A brief review of the background of the border controversy was given, with a description of the technical difficulties presented by local terrain and climate conditions which stymied boundary demarcation efforts and the production of adequate maps and geospatial data to support boundary delimitation and demarcation. Key elements of NIMA's support to the boundary definition process included the exploitation of data obtained from Canada's Radarsat satellite to produce image maps of areas that had not previously been adequately mapped. The satellite data was also used to construct fly-through simulations to assist negotiators in evaluating alternative boundary delineations. Following a formal request from Ecuador and Peru, coordinated through the United States Department of State, NIMA provided technical assistance in the summer and fall of 1999 in the production of the official boundary maps, a process that concluded in October 1999.

41. The delegate from Canada presented a paper on an investigation into the establishment of a cartographic development index (CDI), a tool to analyse the state of cartographic development on a country basis and to evaluate possible reasons for success or lack of success in creating spatial data on a country or regional basis. The CDI was intended to be a statistically based qualitative measure, using five basic parameters: mapped surface area, production period, product scale diversity, number of data themes and accessibility of documents. Parameters were classed to permit assignment of quantitative values and were assigned relative weights. The study covered 126 countries, primarily among the developing nations. Charts were produced, displaying the study results over Asia, Africa and Latin America. It was postulated that political, economic, technological and geographic factors had contributed to the CDI results. Evaluation of the results for causality was an area for further investigation. Future studies would also integrate context variables and sub-indices for evaluation. In the context of gathering information to support such national analysis, it was recommended that the United Nations revive its *World Cartography* publication, with a focus on individual countries. Previous editions of the publication had been a valuable information

resource on the status of spatial data collection and production.

42. The delegate from the Netherlands described a project in spatial data education centred at the International Institute for Aerospace Survey and Earth Sciences (ITC) in Enschede which focused on creating a realistic work environment for geospatial data-handling and processing that would support educational and pedagogical needs, research and technical consultation. The project used the city of Enschede and its associated spatial data as its real-world focus. A variety of data had been gathered and processed from many different sources to create a mini spatial data infrastructure for use by students and ITC staff. Theoretical lectures used the data to frame examples of data problems; the same data was used for practical exercises, linking academic theory to real-world everyday problems. The project also resulted in lessons related to practical aspects of management of a spatial data infrastructure that could be extended to the national level.

43. The delegate from Finland described three projects that had demonstrated successful geospatial data integration at the regional level. The MapBSR project involved eight countries of the Baltic Sea region, each providing its own national data for the creation of a seamless database containing the fundamental framework data elements. The Barents-GDB project included contributions from Norway, Sweden, Finland and the Russian Federation as a regional project, covering the northernmost parts of Europe. The concerted involvement of the local units of the national mapping organizations was a key element of the project. A compact disk of the data set would be issued soon, and a second phase was projected to establish a Web-based environment for data maintenance and sharing. The third project, EuroGlobalMap, represented Europe's contribution to the global map initiative. Thirty-five national mapping authorities had committed themselves to EuroGlobalMap, with Finland responsible for project management. The technical approach to the project would be driven by the decision of the mapping agencies to create a regional seamless database. Work on the project had commenced in January 2001, with projected completion set for the end of 2002. All three of the projects were being produced at a scale equivalent to 1:1,000,000.

44. The delegate from Japan presented its report on technical cooperation in surveying, mapping and charting. Administrative reform in that country in January 2001 had brought together the Geographic Survey Institute, the Japan Hydrographic Department and the National Land Survey all under the Ministry of Land, Infrastructure and Transport. The report described the development of the national spatial data infrastructure at scales ranging from 1:2.500 to 1:25,000. Also noted were three activities aimed at technical cooperation both within Japan and with foreign partners: training, dispatching of technical experts and joint mapping projects.

45. The delegate from Mexico presented views on the concept of fundamental data, noting that it was at the core of all other geospatial data sets and formed the basis for national cartography. Mexico's experience underscored the importance of complete documentation of all decisions relative to fundamental data and metadata and the key role played by standards as an agreement between data producers and data users. The report outlined some of Mexico's activities in data generation and the establishment of metadata distribution centres. A comparison was made of Mexico's fundamental data requirements with those defined in the national spatial data infrastructure of the United States and with the fundamental data themes of the Global Mapping project, revealing the special importance Mexico had placed on soils, climate, geology and the socio-economic conditions of the population.

46. The representative from the Spanish Society of Cartography, Photogrammetry, and Remote Sensing presented a report covering geo-technologies for global development. According to the report, the net effect of technological changes and developments in the twentieth century had been a fundamental change in the work and research methods in dealing with geo-information. At the crux of global development was the need for the benefits of the information society to reach all levels of the population, leading to the creation of the "knowledge society". Specific geo-technologies reviewed in the report included earth observation from outer space, global positioning systems and geographic information systems. The report noted that the integration of geospatial information with a wide range of databases and economic and social activities had already begun. The most urgent task, according to the report, was the definition of public policies that

contribute to the development of the use of geo-technologies in a collaborative mechanism joining the public and private entrepreneurial sectors.

47. A delegate from the United States reported on the current status of the Landsat 7 program 14 months after its launch in April 1999. Product generation and distribution had begun in September 1999, with approximately 12,000 scenes sold to date. Worldwide coverage was available. Quality and precision of the data had exceeded expectations. Key to the success of the program had been the establishment of business partner programmes to buy and distribute the satellite data and the ongoing programme of workshops with members of the commercial community. The key advantages of the Landsat 7 data were continued data compatibility with previous Landsat data, increased spectral bandwidth, an expanded daily scene capture rate, and the availability of better user applications. The report recommended future continued medium-scale data collection to support humanitarian, academic and policy needs. Continued collaboration and establishment of cooperative consortia would be key to future success.

48. A delegate from the United States described the background and current status of the Shuttle Radar Topography Mission (SRTM), a collaborative project involving the National Imagery and Mapping Agency, National Aeronautics and Space Administration (NASA), and the Jet Propulsion Laboratory (JPL). The objective of the mission was the establishment of near-global coverage of digital terrain elevation data (DTED) collected through a single-pass interferometry system on the NASA space shuttle. The post spacing for the resulting DTED would be 30 metres; each post would be accorded its own error budget. Derivative products would include a down-sampled DTED level-1 dataset that would be made publicly available, a 30-metre resolution synthetic aperture radar (SAR) ortho-image mosaic, and shoreline data. Data reduction by JPL and a set of qualified contractors was scheduled to be completed by 2004. The terrain elevation data would be delivered on a continent basis, with first deliveries covering North and South America occurring in 2002.

49. In a report covering a broad overview of developments and advances in technology associated with geospatial information, the delegate from Germany touched on a number of specific developments having profound impact on the collection, production and management of spatial data. The report described revolutionary advances in positioning techniques, digital photogrammetry, digital mapping, two-dimensional geospatial applications such as cadastre, and an overview of geo-informatics as an emerging professional field. Specific examples where the technological advances have had influence in Germany were cited, including the SAPOS GPS-positioning service, the AKDIS and ALKIS digital mapping and cadastral projects, the high-resolution digital elevation model of Lower Saxony, and the mini-geospatial data infrastructure over Kosovo, created by the German space agency DLR. The report singled out management of spatial data as the most significant problem area confronting the field of geo-informatics.

50. The delegate from Venezuela presented its report on the Cartosur project, prefaced by a review of recent legal reforms from July 2000 related to the regulation of activities concerning geography, cartography and cadastre intended to strengthen the national infrastructure and protect the natural and cultural heritage of the country, as reflected in Venezuela's geography. The Cartosur project was intended to provide cartographic coverage and elevation models for an extensive area in the southern part of the Orinoco River basin which had been difficult to map using conventional methods. Reliance on synthetic aperture radar technology was crucial to the success of the project. The first stage of the project covered approximately half of the territory involved; the second stage of the project would proceed using the same technology, with additional work to better determine tree heights to derive better elevation data. The contribution of the National Autonomous University of Mexico in training of personnel was noted.

51. A delegate from the United States reported on the fundamental importance of a standardized national toponymy as a fundamental element in a national spatial data infrastructure. The report noted that toponymy was sometimes difficult to integrate into a spatial data infrastructure because of the necessary involvement of disciplines such as history and linguistics that were frequently on the periphery of the study and collection of spatial data. The report covered developments concerning the standardization of place-names in United Nations activities, including the creation of the United Nations Group of Experts on Geographical Names and the convening of the United Nations Conference on the Standardization of

Geographical Names. A brief history of the founding of the United States Board on Geographic Names was also presented. The Conference noted that the United Nations, through the work of the United Nations Group of Experts and the Conference on the Standardization of Geographical Names, had consistently promoted the creation of national toponymic authorities with a strong legal basis to conduct programmes of national toponymic standardization. The report concluded with a review of toponymic training courses offered under the auspices of the United Nations and the Pan-American Institute of Geography and History.

52. The International Federation of Surveyors (FIG) presented a paper entitled "Land administration infrastructures for sustainable development". It claimed that, in order to achieve a GSDI, there needed to be a focus on interconnectivity. The paper analysed land administration infrastructure as an element of achieving sustainable development. The primary global elements driving the change of spatial information were technology development, microeconomic reform, globalization and sustainable development. The latter element especially would be a driving force in policy development. The report noted that a cadastre was parcel-based and contained a record of current information regarding land interests. The infrastructure contained a unique identification of land parcels. The cadastre included land tenure, administration, use and development, all of which were interrelated, and, through efficient land use management, supported sustainable development. The evolution and development historically of the cadastral concept included viewing land as wealth, a commodity, a resource, and then as a community resource. Facets of the infrastructure included elements of fiscal, judicial, managerial and multipurpose (sustainable) development. Specific examples in Denmark and the approach by Nordic countries as a whole were discussed. The various aspects of spatial data infrastructures — conceptual, political and economic — were discussed, especially in relation to GIS and planning. There was a focus on the educational impact of the latest developments. Establishing the appropriate institutional and organizational infrastructure was crucial for achieving sustainability in any society. The concept of "subsidiarity" was a factor in achieving sustainability and referred to competency level. That was best at the lowest possible level, or the local level. The decentralized model had been adopted by the European Commission, and that approach could be viewed as essential to sustainable development.

53. The Association of South-East Asian Nations (ASEAN) Federation of Land Surveying and Geomatics (FLAG) submitted a paper entitled "The Malaysian digital cadastral database" in which the development and implementation of the database was traced. A modernization strategy was developed in 1986, and the implementation included automating data processing, revising of regulations, including the role of the private sector, and consulting with a consortium of international experts. Implementation of the Cadastral Database Management System (CDMS) had begun in 1999 and was in process. The project included 6 million parcels managed by 12 regional offices. The CDMS had been implemented in 12 states at a cost of approximately US$ 22 million. The components of the project included a quality assurance system, digital imaging management system, improved counter service, remote and internal access, and outsourcing to the private sector. Functioning databases included digital cadastre at the state level and digital topography at the national level. The components of geographic data quality included lineage, completeness, and logical consistency as well as accuracy of position, attributes, and temporal and semantic factors. Strategies for the future included a fully implemented test area with support for the national cadastral data infrastructure. Also discussed were fiscal sustainability and an integrated, holistic approach to database development.

54. The International Cartographic Association (ICA) presented a paper entitled "Geospatial data dissemination: reality, obstacles, and possibilities". There was much attention given to data acquisition, processing and technical tasks, but the process of dissemination for geospatial data was considered just as important. Factors of limitation in the dissemination process included attitude, technological infrastructure, scientific knowledge and also the issue of copyright. For example, in some countries geospatial information was considered a public asset and was freely available, while in most Latin American nations, dissemination of such data was restricted. Also, copyright laws and practices were well established in some countries, but not so in others. Driving forces affecting the dissemination process were globalization, scientific development, and the "right" to information. There was in Latin America a common culture providing

homogeneity. In the region, the international community played a role as both producer and user of geospatial data. Governments continued to be a driving force in dissemination, and there was a noticeable lack of development of "information culture". However, the growth and use of the Internet was and would be a major factor in data dissemination. By 2005, it was expected that significant improvements would be made, but there would still be much to accomplish. By 2010, gains should be sufficient so that "critical mass" was achieved and through data dissemination the necessary "information culture" would hopefully be established.

55. A delegate from the United States presented a paper entitled "The National Atlas of the United States of America". The new Atlas was an ambitious, government-wide partnership with business to make available reliable and authoritative geographic information. Since 1997, there had been much progress and many accomplishments including activation of a worldwide web site, NSDI node, interactive mapping, multimedia maps illustrating temporal aspects and including associated articles; and continuing work on conventional paper maps. A steering committee had been developed to direct the activity associated with agreements and partnerships. Those included 21 federal governmental agencies, National Atlas Information of Canada, and the private sector. Partnerships in the private sector included the Environmental System Research Institute (ESRI) for Web-based mapping, spatial data integration, and the management of distributed spatial databases. Also, an agreement had been reached with LEXON for development of marketing techniques and advice for production and services. There followed a detailed presentation of the online, interactive mapping services provided by the National Atlas. It was noted that more than 200 map layers were available, along with access to the nation's official geographical names database. The digital national atlas was highly versatile and included large-scale capability along with numerous thematic and multimedia maps.

56. The delegate from Japan presented a paper entitled "Promotion of the Global Map Project", in which the Project (GMP) and its history and status were described. The project had been conceived at the United Nations Conference on Environment and Development, in 1992. In November 1999, after a letter had been sent by the United Nations to member States inviting their national mapping organizations to contribute to it, there had been a noticeable increase in project activity. Currently 81 member States were participating, with 35 indicating interest but awaiting governmental approval. There were three basic principles of the Global Map: global coverage, consistent specifications and ease of accessibility. The contents of the Global Map were to be digital map coverage at a scale of 1:1,000,000, with a ground resolution of 1 kilometre, prepared with existing data sets. There were three levels of participation: level-A countries developed the Global Map for their own countries and others, while level-B countries developed the Map for their own countries only. Level-C countries provided data needed for map development. Global Map version 1.0 for five countries has been released. The Global Map provided the framework for GSDI, which had been approved by the Steering Committee of GSDI.

57. A delegate from the United States presented a paper entitled "Cross-border issues that support statistical data for geospatial and cartographic applications". Various issues were addressed which affected the use and integration of statistical data at various levels of geography and different reference dates that supported geospatial and cartographic applications. There were many obstacles to be resolved for data integration, and the characteristics included geography, time, and consistent definition independent of the source. Integrated data products were very desirable but highly complex to create. Issues regarding that problem were definitions, disclosure, avoidance, and geography and time. Data definitions changed over time, creating problems in storing, processing, displaying and decentralizing. Disclosure avoidance referred to making geography from different sources the same or making available all of the data from different sources for the same geography. Internationally, that was further complicated by administrative and legal issues as well as differing cultural approaches. Geography and time were obstacles because there were different vintages of boundaries from the same level of geography, different frameworks, different reference data, and differences in the lowest level of geography for which data were available. There were four general solutions. A common reference date could be adopted, and a common set of geographic definitions could be adopted. Processing changes to geographic entities

more often was prudent, as was providing data at the respondent/location level.

58. The delegate from Brazil presented a paper entitled "Las actividades de la informacion geographica del Instituto Brasileno de Geografia y Estadistica". The various activities of the Institute were discussed regarding the collection, analysis and use of geospatial data. The purpose of the analysis was to provide the tools necessary for statistical analysis and use. Various aspects of data, both physical and cultural, were used, along with the results of environmental analysis, to achieve the necessary results. It was necessary to understand all aspects of the data in order to manage them properly and in order to make the appropriate decisions, leading to achieving sustainable development. Cartography was the basis of communicating that information and, therefore, reflected a spatial portrait. Cartographic application was the means of representing the spatial models and the attendant data as integrated from various other, disparate databases. The census data from 1996 was primarily reflected as analog data and as conventional products. However, in 2000, digital maps were used as a tool for analysis and data dissemination. The production process was supported by the development of an automated cartographic system, which required training in GPS operation and data analysis as well as training for other technical requirements. Digitizing the coastline and topography were accomplished from the best, or largest-scale, maps and charts available. Methodology was established for updating the data from both urban and rural areas, which included geographical names activity. The work spanned a period of approximately three years, and included many of the principal data layers necessary for the framework of an NSDI. Although national agencies were currently the primary users of the information, the user community might expand in future. Data collection for the Global Map Project was proceeding according to schedule.

59. The delegate from Germany presented a paper entitled "A new organization for European Geographic Information" — namely, EuroGeographics, an organization drawing on a network of all of the existing national mapping agencies (NMAs) as well as various projects and products. It supported members in convincing Governments of the importance of establishing adequate national policies regarding geographic information. It also supported the development of a European geographic information infrastructure. There were 28 active (paying) members, and five associate members, with three awaiting governmental approval. The organizational structure consolidated activities through working groups. Specific projects were coordinated, and the work was passed along to the Management Board. There was a proposed research and development forum for sharing information among NMAs, identifying areas of common interest so as to harmonize methods and procedures, developing the concept of partnerships, and arranging workshops. Specific uses of interest had been identified, including geodetic reference systems, data integration, revision of "geodata" databases, Internet-based procedures, and cadastral information systems. EuroGeographics also strived to provide a political framework at the European level and to support ongoing projects.

60. An inquiry and lively discussion, regarding the method selection for the geoid used. The International Civil Aviation Organization indicated that it was considering Earth Gravity Model 96. Europe used EGG97, or Earth Gravity Geoid 97, which was close to 1 centimetre of accuracy. It was noted in the ensuing discussion that horizontal accuracy everywhere was very good, but that vertical accuracy was generally only about 1 metre.

61. At its last meeting in plenary, on 26 January, the Conference took note of the reports of the technical committees and decided that the summaries of the reports would be incorporated into the final report of the Conference. The Conference discussed proposed recommendations submitted by the committees.

62. At the same meeting, the Chairman of Committee I introduced three draft resolutions, entitled "Development needs", "Institutional capacity-building, education and training", and "Economic aspects of modern surveying, mapping, geospatial data infrastructure and land administration", submitted on the basis of informal consultations. The Conference adopted the three draft resolutions, as orally amended (see chap. VI).

63. At the same meeting, the Rapporteur of Committee II introduced a draft resolution entitled "Fundamental data: SIRGAS Project", submitted on the basis of informal consultations. The Conference adopted the draft resolution, as orally amended (see chap. VI). The Conference took note of a second draft

resolution on geographical names, which was absorbed into another one on implementation of NSDI in the Americas, after informal consultations with elected officers and United Nations Secretariat staff.

64. At the same meeting, the Rapporteur of Committee III introduced five draft resolutions, entitled "Land administration and spatial data infrastructure", "Contribution of the Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA)", "Implementation of national spatial data infrastructures in the Americas", "Global Map", and "United Nations Geographic Information Working Group", submitted on the basis of informal consultations. The Conference adopted the five draft resolutions, as orally amended (see chap. VI). The Conference took note of the observation of the delegates from Finland and Germany, regarding Economic and Social Council resolution 131 (VI) of 19 February 1948, entitled "Coordination of cartographic services of specialized agencies and international organizations", that the resolution needed to be reviewed and updated, to take account of digital mapping and information and communications technology developments and their profound impact on the collection, production, and management of spatial data and cartography in general and especially on the social and economical development of member countries.

65. At the same meeting, the delegate from Finland, seconded by Panama, and then reaffirmed by Germany, introduced a draft resolution entitled "Vote of thanks". The Conference adopted the draft resolution, as orally amended (see chap. VI).

# III. Work of Committee I: Development needs and institutional capacity-building

66. At the 5th plenary meeting, on 26 January 2001, Richard Groot (ITC, Netherlands), Chairman of Committee I, presented the oral report of the Committee, which was comprised of 22 participants. The main issues discussed were:

(a) Capacity-building experiences in different countries;

(b) Research/training/application approach;

(c) Lack of personnel at the managerial and technical levels.

67. Several of the participants described capacity-building experiences in various countries and contexts. Special mention was made of the use of human networks to support capacity-building, the importance of strengthening the "feeling of property" of the educational programmes and the fact that each country should determine by itself its educational needs.

68. It was suggested that it might be possible to make the incorporation of capacity-building components compulsory in all projects supported by international and national organizations. The Pan-American Institute of Geography and History (PAIGH) was cited as an organization interested in supporting capacity-building efforts in the Americas. Some thought was given to the potential of human networks. Keeping capacity up to date was noted as a challenge.

69. The need to analyse specific needs at different levels of education and training was mentioned, and a research/training/application approach was discussed. A lack of personnel in land administration with organizational and leadership skills at the managerial and technical levels was noted.

# IV. Work of Committee II: Fundamental data collection and management

70. At the 5th plenary meeting, on 26 January 2001, Luiz Paulo Fortes (SIRGAS, Brazil), Rapporteur of Committee II, presented the oral report of the Committee, which was comprised of 20 participants. Two main topics were discussed regarding fundamental data:

(a) A proposal from representatives of the South American Geocentric Reference System (SIRGAS) Project with respect to the need to adopt a unified global geodetic reference system in the Americas;

(b) A proposal from representatives of the United Nations Group of Experts on Geographical Names on the importance of countries establishing authorities in order to develop principles, policies and procedures for geographical names standardization for various uses, including use as a component of a national spatial data infrastructure.

71. After constructive discussions by the participants, the two proposals were approved for submission to the Conference. Other general issues such as data integrity, fundamental data definition, data collection promotion and data accessibility were also discussed.

# V. Work of Committee III: Spatial data infrastructure development in the Americas

72. At the 5th plenary meeting, on 26 January 2001, Dietmar Gruenreich (Germany), Rapporteur of Committee III, presented the oral report of the Committee, which was comprised of 12 participants.

73. Committee III considered the following:

(a) Cultural aspects of SDI, such as, cooperation (sharing information, harmonization of feature catalogues etc.) and improving the understanding of SDI, starting with a translation of the GSDI implementation guide (GSDI "cookbook") into Spanish;

(b) Support of PC-IDEA;

(c) Content of SDI: cadastre, linked to topography, a common geodetic reference frame and metadata;

(d) Employment of international standards (ISO/TC 211) in the implementation of national and regional SDI;

(e) A clearing house (metadata IS);

(f) Encouragement of national institutions to compete with the private sector;

(g) Funding, institutional capacity-building.

74. After these issues were discussed, the Committee recommended the following five actions:

(a) Support of PC-IDEA as the relevant SDI body in the Americas;

(b) Integration of cadastral and topographic databases;

(c) SDI implementation on a national basis;

(d) A regional Global Map project;

(e) Serving the needs of the United Nations Geographic Information Working Group.

These were discussed in detail in five parallel groups in order to prepare preliminary draft resolutions. These drafts were then edited and discussed.

# VI. Resolutions adopted by the Conference

## A. Titles

1. Development needs
2. Institutional capacity-building, education and training
3. Economic aspects of modern surveying, mapping, geospatial data infrastructure and land administration
4. Fundamental data: SIRGAS Project
5. Land administration and spatial data infrastructure
6. Contribution of the Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA)
7. Implementation of national spatial data infrastructures in the Americas
8. Global Map
9. United Nations Geographic Information Working Group
10. Vote of thanks

## B. Texts

### 1. Development needs

*The Conference,*

*Considering* the sustainable development objectives reflected in the outcomes of the Habitat Conferences and in Agenda 21,

*Recognizing* that spatial data infrastructures are necessary as the foundation for information support,

*Further recognizing* the need to revitalize the geographic information activities in many of the countries of the region,

*Considering* that those activities can in most countries in the region effectively and durably be maintained only with long-term governmental support,

*Recommends* that the Governments of the region create national conditions that will guarantee that the infrastructure for geographic information activities is supported as a strategic policy.

**2. Institutional capacity-building, education and training**

*The Conference,*

*Recognizing* the need for the design and implementation of geospatial solutions for specific problems relating to sustainable development, such as environmental management and natural resources administration, and the well-being of the people of the Americas,

*Noting* the need for institutional capacity-building, especially for the maintenance and management of the geospatial data infrastructure,

1. *Recommends* to the Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA) that it establish a working group on capacity-building to execute the following:

(a) Strengthen existing regional capabilities in spatial data infrastructure by organizing educational workshops and seminars, in cooperation with regional and international organizations in the field of cartography and geographic information, such as the Pan-American Institute of Geography and History, the International Federation of Surveyors, the International Cartographic Association, the International Society for Photogrammetry and Remote Sensing, the International Union of Geodesy and Geophysics and EuroGeographics;

(b) Create networks for the exchange of knowledge and experience in geographic information for institutions and individuals, facilitated by activities of national, regional, and international organizations;

(c) Contribute to filling the gap in leadership and management of change and management of technology for institutional geographic information projects by promoting the establishment of advanced management programmes in geographic information in the region;

2. *Recommends further* that the Permanent Committee on Spatial Data Infrastructure for the Americas strive for the incorporation of capacity-building in the planning stage of projects financed by international and national organizations, such as the World Bank and the Inter-American Development Bank.

**3. Economic aspects of modern surveying, mapping, geospatial data infrastructure and land administration**

*The Conference,*

*Noting* resolution 6 of the Fifteenth United Nations Regional Cartographic Conference for Asia and the Pacific, "Economic aspects of modern surveying, mapping, geospatial data infrastructure and land administration programmes",

*Recognizing* that in the Americas many Governments also seek to reduce the cost to the taxpayer of fundamental and infrastructural geospatial data services by various forms of privatization, cost recovery, outsourcing or revenue-generating initiatives,

*Considering* that in the Americas those initiatives also have a significant technical, organizational and institutional impact on national spatial data infrastructure,

*Bearing in mind* that the expanding array of options for professionals in the geographic information field imposes choices in which economics plays a decisive role, both in government and the private sector,

1. *Reaffirms* resolution 6 of the Fifteenth United Nations Regional Cartographic Conference for Asia and the Pacific;

2. *Requests* that the United Nations Secretariat, within available resources and in cooperation with the Permanent Committee on GIS Infrastructure for Asia and the Pacific, take initiative to develop the programme of the proposed workshop on economic aspects to be hosted by the Government of India.

**4. Fundamental data: SIRGAS Project**

*The Conference,*

*Recognizing* the importance of high quality tri-dimensional position data referred to a unique global

geodetic reference system for spatial data infrastructure,

*Noting* that there are large differences between existing national geodetic datums,

*Considering* the achievements obtained by the South American Geocentric Reference System (SIRGAS) Project with respect to a unified geodetic datum,

*Bearing in mind* that the SIRGAS reference frame is based on the International Terrestrial Reference Frame, which is practically identical to the World Geodetic System of 1984,

*Also bearing in mind* that SIRGAS is supporting the participating countries in terms of knowledge transfer and training,

1. *Recommends* that member countries of the Americas integrate their national geodetic reference systems into a reference system compatible with SIRGAS;

2. *Also recommends* that member countries of the Americas provide to SIRGAS gravity data for computation of the geoid as the reference surface of the vertical (height) system;

3. *Further recommends* that member countries of the Americas correct their levelling by gravimetric observations in order to compute geopotential numbers and connect the levelling networks with neighbouring countries, making all that information available to SIRGAS.

### 5. Land administration and spatial data infrastructure

*The Conference,*

*Recognizing* the importance of efficient and effective land administration systems in supporting the development of land markets, in providing security of tenure and access to land, in facilitating the provision of credit to farmers, in ensuring equitable land taxation, promoting better land-use planning and, more generally, in promoting economic development, social cohesion and sustainable development,

*Recalling* the deliberations of the Sixth United Nations Regional Cartographic Conference for the Americas on the need to better understand and appreciate the relationship between land administration and spatial data infrastructures,

*Noting* the difficulties being faced by many member States in designing appropriate spatial data infrastructures to support effective land administration and in integrating cadastral and topographic spatial data, especially in digital form,

*Further noting* the generous offer of the Government of Mexico to host a special workshop on the integration of spatial data infrastructure initiatives and cadastral activities, along with the meeting of the Fourth Permanent Committee on Spatial Data Infrastructure for the Americas,

*Also noting* the need to improve the capacity to design, build and manage land administration systems which incorporate appropriate spatial data infrastructures,

1. *Supports* the resolutions of the Fifteenth United Nations Regional Cartographic Conference for Asia and the Pacific and endorses the Bathurst Declaration on Land Administration for Sustainable Development;

2. *Requests* the United Nations Secretariat, within available resources and with the support of the Permanent Committee on Spatial Data Infrastructure for the Americas and the International Federation of Surveyors, to provide support on the programme of the interregional workshop to be hosted by the Government of Mexico to determine policies and programmes for educational, training and professional capacity-building that will ensure the development of appropriate land administration systems and associated spatial data infrastructures;

3. *Recommends* that member States develop appropriate institutional, legal and technical processes to integrate land administration and topographic mapping programmes within the context of a wider national strategy for spatial data infrastructure.

### 6. Contribution of the Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA)

*The Conference,*

*Noting* with appreciation the formation of the Permanent Committee on Spatial Data Infrastructure for the Americas, pursuant to resolution 3 of the Sixth

United Nations Regional Cartographic Conference for the Americas, and the meaningful role that it is serving now in the region,

*Also noting* the works of similar regional organizations in Europe, Asia and the Pacific,

*Recognizing* the need to increase the works of PC-IDEA in order to derive economic, social, and environmental benefits by the application of geo-information,

*Conscious* of the cultural and social background of regions and subregions in the Americas when developing a conceptual framework for a regional SDI,

1. *Recommends* that the Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA):

(a) Develop and implement a work plan and a schedule for its implementation, including: the establishment of formal liaisons with the appropriate regional and global initiatives and organizations (e.g., United Nations Geographic Information Working Group, International Steering Committee for Global Mapping, ISO/TC 211) and with the network of experts in the region; and the translation of spatial data infrastructure terminology into Spanish, starting with the global spatial data infrastructure (GSDI) framework book;

(b) Recall the need to report about PC-IDEA developments to the highest levels of government in order to secure visibility and sustainability of the resources to establish spatial data infrastructures;

(c) Take responsibility for monitoring the implementation of the resolutions adopted by the Conference and to report its findings to subsequent regional cartographic conferences.

## 7. Implementation of national spatial data infrastructures in the Americas

*The Conference,*

*Recalling* Agenda 21 which promoted principles and practices to support the achievement of sustainable development locally, nationally and globally,

*Further recalling* that the Sixth United Nations Regional Cartographic Conference for the Americas adopted resolutions encouraging the development of national spatial data infrastructures that are consistent with regional and global spatial data initiatives,

*Also recalling* the need for geographic information to help respond to and prepare future mitigation measures for natural disasters and earthquakes,

*Considering* the importance of standardized and consistent geographical names as a fundamental data set of national and regional spatial data infrastructures,

*Noting* that seventeen nations of the Americas are now either implementing or planning to implement a spatial data infrastructure,

*Further noting* that approximately twenty nations in the region have implemented a spatial data clearing house and catalogue service, part of the global spatial data clearing house network,

*Recognizing* the ongoing effort to develop technical, metadata and other data standards by international bodies, such as ISO/TC 211 and the OpenGIS Consortium, which will provide a basis for compatibility, regionally and globally,

*Bearing in mind* the particular needs and objectives of individual countries,

*Noting further* the legal, economic, and cultural differences of States which must be respected and addressed in the infrastructure development initiatives of each,

*Further recognizing* that a global spatial data infrastructure is emerging which will be built upon the adoption of common infrastructure components and standards and will be facilitated by the coordinated efforts of nations and regional bodies,

*Further recognizing* that the Permanent Committee on Spatial Data Infrastructure for the Americas will support and provide benefits to member nations by facilitating the sharing of experiences and lessons learned and by addressing common needs and interests,

1. *Recommends* that member States share experiences and address common needs and interests within the Americas and with other regions of the world, through the Permanent Committee on spatial data infrastructure for the Americas;

2. *Further recommends* that member States promote or assist in the establishment of national

geographical names authorities to develop principles, policies, and procedures for geographical names standardization;

3. *Also recommends* that all countries of the Americas embrace the concept of national spatial data infrastructures and develop implementation strategies that support regional and global SDI initiatives while meeting national objectives.

**8. Global Map**

*The Conference,*

*Noting* the development of the Global Map as a significant contribution to the implementation of Agenda 21,

*Noting with appreciation* that the Global Map, version 1.0, data sets are completed and made available for an initial group of nations,

*Recognizing* that the development of the Global Map contributes to the development of a regional spatial data infrastructure for the Americas, the global spatial data infrastructure work plan, the United Nations geographic database and other SDI initiatives, which are vital for sustainable development and improved mitigation of natural disasters,

1. *Recommends* to those member States not contributing to the Global Map project to consider participation, with the assistance of the International Steering Committee for Global Mapping and the Permanent Committee on Spatial Data Infrastructure for the Americas;

2. *Further recommends* that the forthcoming 8th meeting of the Steering Committee reconsider, when evaluating the Global Map, phase 2, the issues concerning global mapping specifications, in accordance with user requirements at the national, regional and global levels.

**9. United Nations Geographic Information Working Group**

*The Conference,*

*Welcoming* the establishment of the United Nations Geographic Information Working Group,

*Expressing* its support for the continued efforts of the Working Group, in particular, the formulation of a system-wide geographic information strategic plan and the proposed development of a United Nations geographic database,

*Recognizing* the importance of a multiscale, seamless global database that addresses different needs of the United Nations,

*Also recognizing* the role of national mapping agencies in advancing these initiatives,

*Expressing* its support for the resolution adopted at the Fifteenth United Nations Regional Cartographic Conference for Asia and the Pacific, in cooperation with the United Nations geographic database initiative,

1. *Invites* the participation of national mapping agencies, other governmental and non-governmental organizations, international and regional organizations, industry and academia, in advancing the objectives of the Working Group;

2. *Recommends* that national mapping and other responsible agencies provide maps showing framework data layers, in analogical and digital formats, when available, to the United Nations.

**10. Vote of thanks**

*The Conference,*

1. *Expresses its deep appreciation* to the Secretariat for the excellent substantive servicing provided to the Conference;

2. *Expresses its sincere appreciation* to the Bureau of the Conference, especially to the Vice-President, Mr. Santiago Borrero, and to the officers of the technical committees, the invited speakers and the representatives of international organizations, for the excellent manner in which the Conference was conducted;

3. *Expresses its thanks* to the other officers of the Conference and staff of the United Nations, including the editors, translators and secretarial support staff for their dedicated work.

# Annex I

## List of participants

### A. States Members of the United Nations

**Argentina**

*Representative*

Mr. Ricardo **Millet**, Director, Instituto Geografico Militar

*Deputy Representative*

Ms. Mabel **Alvarez de Lopez**, Secretario-General, Consejo Federal del Catastro

**Brazil**

*Representative*

Ms. Isabel de Fatima Teixeira **Silva**, Chief of Department of Cartography, Directory of Geosciences, Brazilian Institute of Geography and Statistics

*Deputy Representative*

Mr. Alex Giacomelli da **Silva**, Second Secretary, Permanent Mission of Brazil to the United Nations

**Benin**

*Representative*

H.E. Mr. Joel **Adechi**, Ambassador, Permanent Mission of Benin to the United Nations

*Deputy Representatives*

Mr. Francois G. **Noudegbressi**, Director, Ministry of Environment, Habitat and Urbanism

Mr. Romain **Tognifode**, Director-General of National Geographic Institute

Mr. Obed **Todome**, Director of Cartography, National Geographic Institute

Mrs. Elisha **Nicole**, Adviser, Permanent Mission of Benin to the United Nations

**Bolivia**

*Representative*

Consejero Martha Beatriz **Lopez de Mitre**, Encargado de Negocios

*Deputy Representative*

Mr. Eduardo Gallardo **Aparicio**, Second Secretary, Permanent Mission of Bolivia to the United Nations

**Brunei Darussalam**

*Representative*

Mr. Pg Haji Matusin bin Pg **Haji Matasan**, Surveyor-General, Survey Department, Ministry of Development

*Deputy Representative*

Mr. Awang Abd Aziz bin **Dato Hj Abdullah**

**Canada**

*Representative*

Mr. Yves **Belzile**, Directeur, Acquisition des données, Centre d'information topographique, Direction des Services cartographiques, Géomatique Canada, Secteur des sciences de la terre, Ministère des ressources naturelle du Canada

*Deputy Representative*

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*Advisers*

Mr. Yves **Baudouin**, Professor, Department of Geography, Université du Québec à Montréal

Mr. Pierre **Inkel**, Université du Québec à Montréal

**China**

*Representative*

Mr. **Wang** Chunfeng, Deputy Director General, State Bureau of Surveying and Mapping of China

*Deputy Representatives*

Mr. **Peng** Zhenzhong, Deputy Director General, Department of Land Survey, State Bureau of Surveying and Mapping

Mr. **Sun** Baowu, Senior Program Officer, Department of International Cooperation, State Bureau of Surveying and Mapping

Mr. **Fu** Fengshan, Attaché, Ministry of Foreign Affairs

**Colombia**

*Representative*

Señor Alfonso Valdivieso **Sarmiento**, Ambassador, Permanent Mission of Colombia to the United Nations

*Deputy Representatives*

Mr. Santiago **Borrero**, Director-General, Instituto Geografico Agustin Coadazii

Señora Fanery Valencia **Villegas**, Subdirectora de Cartografia del Instituto Geográfico Agustin Codazzi

Señor Mauricio **Baquero**, Second Secretary, Permanent Mission of Colombia to the United Nations

**Cuba**

*Representative*

Coronel Eloy L. Alum **Ortiz**, Jefe de la Oficina Nacional de Hidrografia y Geodesia

*Deputy Representatives*

Tte. Coronel Ing. Ramón Nodal **Jorge**, Jefe Departamento de Geodesia y Cartografia de la Oficina Nacional de Hidrografia y Geodesia

Sra. Mercedes Vicente **Sotolongo**, First Secretary, Permanent Mission of Cuba to the United Nations

Sr. Luis Alberto Amoros **Nuñez**, Second Secretary, Permanent Mission of Cuba to the United Nations

**Cyprus**

*Representative*

Mr. Prodromos **Vasileiou**, President of the Cyprus Permanent Committee for the Standardization of Geographical Names, Ministry of Education and Culture

*Deputy Representative*

Mr. Demetris **Hadjiargyrou**, Second Secretary, Permanent Mission of Cyprus to the United Nations

**Dominican Republic**

*Representative*

Mr. Eugenio A. Matos **Rodriguez**, Coronel Ejercito Naciones, Director del Instituto Cartográfico Militar

*Deputy Representative*

Mr. Ramón Antonio Guerrero **Severino**, Teniente Coronel E. N., Encargado del Departamento de Producción

**Ecuador**

*Representative*

Teniente Coronel Ingeniero Giauco **Bustos**

**Finland**

*Representative*

Mr. Jarmo **Ratia**, Director-General, National Land Survey of Finland

*Deputy Representatives*

Mr. Risto **Kuittinen**, Director-General, Finnish Geodetic Institute

Mr. Juhani **Kakkuri**, Professor, International Union of Geodesy and Geophysics (IUGG)

**Germany**

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Prof. Dr. Gottfried **Konecny**, Advisory Group for Development Assistance in Surveying and Geo-Information Technology

Mr. Hagen **Graeff**, President of the German Surveying Association

*Adviser*

Prof. Dr. Hermann **Drewes**, Adviser, German Research Institute for Geodesy

**Guatemala**

*Representative*

Mr. Gert **Rosenthal**, Ambassador, Permanent Representative, Permanent Mission of Guatemala to the United Nations

*Deputy Representative*

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**Holy See**

*Observers*

H.E. Archbishop Renato R. **Martino**, Permanent Mission of the Holy See to the United Nations

Msgr. Marek **Zalewski**, Secretary, Permanent Mission of the Holy See to the United Nations

Mr. Rhys **Gray**, Attaché, Permanent Mission of the Holy See to the United Nations

**Honduras**

*Representative*

Dr. Noe Pineda **Portillo**, Director General, Instituto Geografico Nacional

**India**

*Representative*

Dr. H. K. **Narula**, General Manager, Cartography, Airports Authority of India

**Japan**

*Representative*

Mr. Minoru **Akiyama**, Director of Geographic Department, Geographical Survey Institute, Ministry of Construction

*Deputy Representatives*

Mr. Ryoichi **Kouda**, Chief, Information and Publications Office, Geological Information Center, Geological Survey of Japan, Agency of Industrial Science and Technology, Ministry of International Trade and Industry

Mr. Yoshiyasu **Kawaguchi**, Second Secretary, Permanent Mission of Japan to the United Nations

**Kazakhstan**

*Representative*

Mr. Amangeldy **Jampeisov**, Deputy Chairman of the State Agency on Management of Ground Resources

*Deputy Representative*

Mr. Maral **Sagyndyk**, main expert of the Department of Geodesy and Geo-information Systems

**Mexico**

*Representative*

Mr. Antonio **Puig**, President, Instituto Nacional de Estadistica Geografia e Informatica (INEGI)

*Deputy Representative*

Ms. Guadalupe **Lopez**, General Director of Geography, Instituto Nacional de Estadistica Geografia e Informatica

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*Representative*

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Mr. F. M. **Tsheehama**, Permanent Secretary, Ministry of Lands, Resettlement and Rehabilitation

Dr. Karim **Owolabi**, Surveyor-General, Ministry of Lands, Resettlement and Rehabilitation

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*Representative*

Dr. Menno-Jan **Kraak**, International Institute for Aerospace Survey and Earth Sciences, Division of Geoinformatics, Cartography and Visualization

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Col. Nasser Sultan **Al-Harthy**, Director of the National Survey Authority, Ministry of Defense

**Panama**

*Representative*

Ing. Denis **Fuentes**, Director del Instituto Geográfico Nacional "Tommy Guardia"

*Deputy Representative*

Señor Israel **Sanchez**, Subdirector del Instituto Geográfico Nacional

**Peru**

*Representative*

Mr. Jorge **Valdez**, Represente Permanente del Peru ante las Naciones Unidas

*Deputy Representatives*

Mayor General FAP Wilar Gamarra **Molina**, Director de Aerofotografia de la Fuerza Aérea

Comandante FAP Leonardo Maldonado **Loechle**, del Departamento de Aerofotografia de la Fuerza Aérea

General de Brigada Emilio Gustavo **Bobbio Rosas**, Jefe del Instituto Geografico Nacional

Teniente Coronel EP Rolando Yarihuaman **Aguilar**, Director de Cartografia del Instituto Geografico Nacional

Mayor EP Juan **Muñoz Curto**, Director de Geografia del Instituto Geografico Nacional

Contralmirante AP Héctor Soldi **Soldi**, Director de Ilidrografia y Navegacion de la Marina de Guerra del Peru

Capitan de Fragata AP Aquiles **Carcovich**, de la Direccion de Hidrografia y Navegación de la Marina de Guerra del Peru

Segundo Secretario Augusto **Cabrera**, funcionario de la Mision del Peru ante las Naciones Unidas

**Russian Federation**

*Representative*

Mr. Alexander **Drazhnyuk**, President of the Federal Service of Geodesy and Cartography of Russia

*Deputy Representatives*

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Mr. Alexander **Yuskevich**, Director, St. Petersburg, aerogeodetic enterprise

Mr. Vladimir **Berk**, Director, mapping geodetic centre

Mr. Sergey **Pinaev**, Counsellor, Department of Ministry of Foreign Affairs

**Spain**

*Representative*

Excmo. Sr. D. Inocencio F. **Arias**, Permanent Representative, Permanent Mission of Spain to the United Nations

*Deputy Representatives*

Ilmo. Sr. D. Juan Luis **Flores**, Deputy Permanent Representative, Permanent Mission of Spain to the United Nations

Ilmo. Sr. D. Manuel **Garcia-Perez**, Secretario-General, Instituto Geográfico Nacional, Ministerio de Fomento

Sr. D. José Cebrián **Pascual**, Subdirector General de Producción Cartográfica, Ministerio de Fomento

**Syrian Arab Republic**

*Representative*

Geol. Marwan **Koudmani**, Expert in Remote Sensing, General Organization of Remote Sensing

*Deputy Representative*

Mr. Marwan **Soukar**, Cartographic Engineer, General Establishment of Surveying

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*Deputy Representative*

Mr. Yavuz **Çubukç**, First Secretary, Permanent Mission of Turkey to the United Nations

**United Kingdom of Great Britain and Northern Ireland**

*Representative*

Mr. Roger **Marsden**, British Liaison Officer, Military Survey

**United States of America**

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Mr. Richard **Akers**, Director, Geospatial Information and Services Office, Americas Center, National Imagery and Mapping Agency, Department of Defense

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Ms. Cynthia **Cluck**, Chief, External Coordination, United States Geological Survey, Department of the Interior

Mr. Leo **Dillon**, Cartographer, Bureau of Intelligence and Research, Department of State

Mr. Randall **Flynn**, Geographer, National Imagery and Mapping Agency, Department of Defense

Mr. John **Gates**, Chief, International Operations, Americas Center, National Imagery and Mapping Agency, Department of Defense

Mr. John **Kelmelis**, Chief Scientist for Geography, United States Geological Survey, Department of the Interior

Mr. John **Moeller**, Staff Director, Federal Geographic Data Committee, United States Geological Survey, Department of the Interior

Mr. Roger **Payne**, Executive Secretary to the United States Board on Geographic Names, United States Geological Survey

Mr. Timothy **Trainor**, Chief, Cartographic Operations Branch, Geography Division, United States Census Bureau, Department of Commerce

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*Representative*

Coronel (Ej.) Romer Mena **Nava**, Presidente del Instituto Geografico de Venezuela Simón Bolivar (IGVSB)

*Deputy Representatives*

Licenciado. Marlys García **Sandoval**, Coordinadora de la Oficina de Relaciones Internacionales y Cooperación del Instituto Geografico de Venezuela Simón Bolivar

Ing. Gloria **Gonzalez**, Coordinadora Técnica de Vuelos, Jefe del Proyecto Cartográfico del Sur Cartosur

Ms. Julia **Lopez**, Second Secretary, Permanent Mission of Venezuela to the United Nations

## B. Specialized agencies

**International Civil Aviation Organization (ICAO)**

Mr. A. **Pavlovic**, Chief, Aeronautical Information and Charts Section, Air Navigation Bureau

**United Nations Environment Programme (UNEP)**

Mr. Ashbindu **Singh**, Regional Coordinator, Division of Early Warning and Assessment, North America

**United Nations Educational, Scientific and Cultural Organization (UNESCO)**

Mr. A. **Hamad**, Director a.i., Liaison Office, United Nations Headquarters, New York

**World Bank**

Mr. David **Gray**, Latin America and the Caribbean Region

Mr. Gregory **Parkas**, Senior Cartographer

Mr. Frederic de **Dinechin**, Land Information Specialist

**World Meteorological Organization (WMO)**

Dr. D. D. C. Don **Nanjira**

## C. International scientific organizations

**EuroGeographics (Formerly Comité européen des responsables de la cartographie officielle (CERCO))**

Dr-Ing. Dietmar **Gruenreich**, German Federal Agency for Cartography and Geodesy

**General Organization of Remote Sensing (GORS)**

Dr. Eng. Hussein **Ibrahim**, Director-General, Head of Administration Board

**International Cartographic Association (ICA)**

Mr. Bengt **Rystedt**, President, National Land Survey

Dr. Carmen **Reyes**, General Director, Centro de Investigación en Geografía y Geomática

Mr. Timothy **Trainor**, Chief, Cartographic Operations Branch, Geography Division, U.S. Census Bureau

**International Federation of Surveyors (FIG)**

Mr. Robert W. **Foster**, President, International Federation of Surveyors

Prof. Stig **Enemark**, Department of Development and Planning, Aalborg University, Denmark

Prof. Ian **Williamson**, Department of Geomatics, University of Melbourne, Australia; Director, United Nations Liaison, International Federation of Surveyors

**International Institute for Aerospace Survey and Earth Sciences (ITC)**

Mr. Richard **Groot**, International Institute for Aerospace Survey and Earth Science

**International Society for Photogrammetry and Remote Sensing (ISPRS)**

Mr. Lawrence **Fritz**, Past President of International Society for Photogrammetry and Remote Sensing

Prof. John **Trinder**, President, International Society for Photogrammetry and Remote Sensing

**ISO/TC 211**

Mr. Olaf **Ostensen**, Chairman of ISO/TC 211, Norwegian Mapping Authority

**International Union of Geodesy and Geophysics (IUGG)**

Mr. Juhani **Kakkuri**, Director-General, Finnish Geodetic Institute

**Organisation of Islamic Capitals and Cities (OICC)**

Dr. Ayad **Al-Taai**, Resident Representative

**Pan-American Institute of Geography and History (PAIGH)**

Mr. Paul L. **Peeler**, Jr., President, Commission of Cartography, Pan-American Institute of Geography and History

**Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP)**

Mr. Minoru **Akiyama**, Director, Geographic Department, Geographical Survey Institute of Japan

**Permanent Committee on Spatial Data Infrastructure for the Americas (PC-IDEA)**

Ms. Dora **Rey**, Executive Secretary, PC-IDEA (Colombia)

Ms. Mabel **Alvarez de Lopez**, Director, Dirección de Catastro e Información (Argentina)

Mr. Fernando **Boiton**, Director-General, Instituto Geográfico Nacional (Guatemala)

Mr. Noe Pineda **Portillo**, Director-General, Instituto Geográfico Nacional (Honduras)

Ms. Maria Guadalupe **Lopez Chávez**, Director-General de Geografia, Instituto Nacional de Estadistica Geografia (Mexico)

Mr. Antonio **Puig**, President, Instituto Nacional de Estadistica Geografia (Mexico)

Ms. Adriana **Barajas Cortés**, Ingenier, Secretaria de Medio Ambiente (Mexico)

Mr. Denis **Fuentes**, Director, Instituto Geografico Nacional "Tommy Guardia" (Panama)

Mr. Eugenio A. **Matos Rodriguez**, Director, Instituto Geográfico Militar (Dominican Republic)

Mr. Ramón **Guerrero Severino**, Enc. Produccion (Dominican Republic)

Mr. Romer **Mena Nava**, Director-General, Servicio Autónomo de Geográfia (Venezuela)

Ms. Gloria **Gonzalez**, Coordinator Técnico Área de Vuelo, Servicio Autónomo de Geográfia (Venezuela)

Ms. Marlys **Garcia**, Ingeniera (Venezuela)

## D. Invited speakers

Mr. John Edward **Estes**, Professor of Geography, Director Remote Sensing Research Unit, Santa Barbara, CA, United States of America

Mr. John R. **Parker**, Former Registrar of Geographic Names, Victoria, Australia, Past Chairman of United Nations Group of Experts on Geographical Names, Asia, South-East and Pacific, South-West Division, Surveyor-General (Retired)

Mr. Dato Abdul Majid bin **Mohamed**, President, ASEAN Federation of Land Surveying and Geomatics, Malaysia

Mr. Robert W. **Foster**, President, International Federation of Surveyors

Prof. John **Trinder**, President, International Society for Photogrammetry and Remote Sensing

Mr. Bengt **Rystedt**, President, National Land Survey, International Cartographic Association

Mr. Richard **Groot**, International Institute for Aerospace Survey and Earth Science

Mr. Santiago **Borrero**, Director-General, Instituto Geografico Agustin Coadazii

Mr. Paulo Sauto **Fortes**, President, Committee on the Geodetic Unified Reference System for South America

Mr. Olaf **Ostensen**, Chairman of ISO/TC 211, Norwegian Mapping Authority

Prof. Stig **Enemark**, Department of Development and Planning, Aalborg University, Denmark

Prof. Ian **Williamson**, Department of Geomatics, University of Melbourne, Australia; Director, United Nations Liaison, International Federation of Surveyors

Ms. Vanessa **Lawrence**, Director-General, Ordnance Survey, United Kingdom

Mr. Ramon Lorenzo **Martinez**, President of the Spanish Society of Cartography, Photogrammetry and Remote Sensing

## E. Observers

Mr. David **Blair**, Director, Australian National Placenames Survey

Mr. Robert **Sandev**, Associate GIS Officer, Division of Ocean Affairs and Law of the Sea, Office of Legal Affairs, United Nations

Ms. C. **Bauer-Spiegel**, City Server

Mr. Leonard J. **Smith**, Mapping and Engineering Software Consultant

## F. United Nations Cartographic Section Library and Information Resources Division, Department of Public Information

Dr. Hiroshi **Murakami**, Chief of Section, Chair, United Nations Geographic Information Working Group

Ms. Alice **Chow**, GIS Officer (Speaker), Deputy Chair, United Nations Geographic Information Working Group

Mr. Vladimir **Bessarabov**, Cartographer

Ms. Hélène **Brzy**, Associate GIS Officer

## G. United Nations Secretariat

*Executive Secretary*

Mr. Vladimir **Zelenov**, Deputy Secretary of the Economic and Social Council, General Assembly and Economic and Social Council Affairs Division, Department of General Assembly and Conference Services

*Substantive Secretary*

Mr. Amor **Laaribi**, Cartographer (GIS specialist), Office of the Director, Statistics Division

# Annex II

## List of documents

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| E/CONF.93/1 | Provisional agenda | 4 (b) |
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| E/CONF.93/INF.1 | Documentation for the Conference | |
| E/CONF.93/INF.2 | List of documents | |
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| E/CONF.93/L.1<br>L.1 (Abstract) | Mapping Services Branch, Natural Resources Canada (Submitted by Canada) | 5 |
| E/CONF.93/L.2 | Informe nacional de la República Argentina (Submitted by Argentina) | 5 |
| E/CONF.93/L.3<br>L.3 (Abstract) | Cooperation in the Baltic and Barents regions in joint database projects (Submitted by Finland) | 7 (a) |
| E/CONF.93/L.4<br>L.4 (Abstract) | Project Cartosur I (Submitted by Venezuela) | 7 (b) |
| E/CONF.93/L.5 | Ponencia del Presidente del IGV SB, Aspectos institucionales (Submitted by Venezuela) | 7 (a) |
| E/CONF.93/L.6<br>L.6 (Abstract) | Cooperación de Espana con los paises Iberoamericanos en capacitación técnica relativa a materias cartograficas, sistémas de información geográfica, tratamiento digital de imágenes y tecnologias GPS (Submitted by Spain) | 7 (a) |
| E/CONF.93/L.7 | Las actividades de la informacion geographica del Instituto Brasileno de Geografia y Estadistica (Submitted by Brazil) | 7 (c) |
| E/CONF.93/L.8<br>L.8 (Abstract) | Technical cooperation in surveying, mapping and charting (Submitted by Japan) | 7 (a) |
| E/CONF.93/L.9<br>L.9 (Abstract) | Cartographic work in Japan 1997-1999 (Submitted by Japan) | 7 (b) |
| E/CONF.93/L.10 | Experience at the fifteenth United Nations Regional Cartographic Conference for Asia and the Pacific (Submitted by the Permanent Committee on GIS Infrastructure for Asia and the Pacific) | 7 (a) |
| E/CONF.93/L.11 | Surveying, mapping and charting in Sri Lanka (Submitted by Sri Lanka) | 5 |

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| E/CONF.93/L.12 | Education and the geospatial data infrastructure: a project-based approach (Submitted by the Netherlands) | 7 (a) |
| E/CONF.93/L.13<br>L.13 (Abstract) | Cartographic Development Index (CDI): international cartographic evaluation (Submitted by Canada) | 7 (c) |
| E/CONF.93/INF.4 | Activity of the Working Group on Gazetteers and Toponymic Data Files of the United Nations Group of Experts on Geographical Names (Submitted by the United States) | 7 (b) |
| E/CONF.93/INF.5 | Promotion of the Global Map Project (Submitted by Japan) | 7 (a) |
| E/CONF.93/INF.6 | Training courses sponsored or sanctioned by the United Nations Group of Experts on Geographical Names with special attention to the activity and description of the course in applied toponymy offered by the Pan-American Institute of Geography and History (Submitted by the United States) | 7 (b) |
| E/CONF.93/INF.7 | Informe nacional del servicio hidrografico y geodesico de la República de Cuba (Submitted by Cuba) | 5 |
| E/CONF.93/INF.8 | The construction of a 1:50,000 dataset: a key component of China's national spatial data infrastructure (Submitted by China) | 5 |
| E/CONF.93/INF.9 | Cross-border issues that support statistical data for geospatial and cartographic applications (Submitted by the United States) | 7 (a) |
| E/CONF.93/INF.10 | Standardization of geographical names and cartographic application (Submitted by the United States) | 7 (c) |
| E/CONF.93/INF.11 | Reporte nacional compilado por el INEGI (Submitted by Mexico) | 5 |
| E/CONF.93/INF.12 | Global geographic information for United Nations operations (submitted by the United Nations, Department of Public Information, Cartographic Unit) | 7 (a) |
| E/CONF.93/INF.13 | Follow-up to the resolutions adopted by the sixth United Nations Regional Cartographic Conference for the Americas (Submitted by the Secretariat and the Permanent Committee on SDI for the Americas) | 6 |

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| E/CONF.93/INF.14 | Unified height reference system for the Americas (Submitted by Germany) | 7 (b) |
| E/CONF.93/INF.15 | Landsat 7: the first 14 months (Submitted by the United States) | 7 (b) |
| E/CONF.93/INF.16 | The National Atlas of the United States of America (Submitted by the United States) | 7 (c) |
| E/CONF.93/INF.17 | Report of the Special Working Group Meeting of Delegates and Experts of the United Nations Regional Cartographic Conference (Submitted by the Secretariat) | 6 |
| E/CONF.93/INF.18 | The status of cartographic activities in the United States of America (Submitted by the United States) | 5 |
| E/CONF.93/INF.19 | Partnering to enhance geospatial data access (Submitted by the United States) | 7 (a) |
| E/CONF.93/INF.20 | Informe sobre el estado actual de la cartografía básica de Colombia (Submitted by Colombia) | 5 |
| E/CONF.93/INF.21 | Electronic navigational charts: status of production in the Americas (Submitted by the International Hydrographic Bureau) | 7 (c) |
| E/CONF.93/INF.22 | Shuttle radar topographic mission (Submitted by the United States) | 7 (b) |
| E/CONF.93/INF.23 | NIMA support to the Ecuador/Peru peace negotiations (Submitted by the United States) | 7 (a) |
| E/CONF.93/INF.24 | Spatial information management in Hamburg (Submitted by Germany) | 7 (b) |
| E/CONF.93/INF.25 | Geodata information system: a German perspective (Submitted by Germany) | 7 (a) |
| E/CONF.93/INF.26 | Federal Agency for Cartography and Geodesy of Germany (Submitted by Germany) | 5 |
| E/CONF.93/INF.27 | United Kingdom Hydrographic Office: activities in the Caribbean (Submitted by the United Kingdom) | 5 |
| E/CONF.93/INF.28 | A new organization for European geographic information (Submitted by Germany) | 7 (a) |
| E/CONF.93/INF.29 | Survey and mapping in Cyprus: the standardization of geographical names and cartography in Cyprus (Submitted by Cyprus) | 5 |

## Background papers

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| E/CONF.93/B.P.1 | Importance of geographic names in a spatial data infrastructure (Submitted by John R. Parker, Licensed Surveyor) | 7 (b) |
| E/CONF.93/B.P.2<br>B.P. 2 (Abstract) | SIRGAS and the geodetic network for the Americas (Submitted by Sistema de Referéncia Geocéntrico para a América do Sul) | 7 (a) |
| E/CONF.93/B.P.3<br>B.P. 3 (Abstract) | Economic issues in the evolution of national geospatial data infrastructure (Submitted by the International Institute for Aerospace Survey and Earth Sciences) | 7 (a) |
| E/CONF.93/B.P.4 | The World's (the Americas') mapping, geodetic control, remote sensing and geographic information systems, 2000 (Submitted by the Secretariat) | 7 (b) |
| E/CONF.93/B.P.5<br>B.P. 5 (Abstract) | Developments in the acquisition of spatial data from imagery (Submitted by the International Society for Photogrammetry and Remote Sensing) | 7 (b) |
| E/CONF.93/B.P.6 | Spatial information management in the twenty-first century (Submitted by the International Federation of Surveyors) | 7 (a) |
| E/CONF.93/B.P.7 | The Malaysian digital cadastral database (Submitted by ASEAN Federation of Land Surveying and Geomatics) | 7 (c) |
| E/CONF.93/B.P.8 | Spatial standards as a basis for a sustainable geospatial data infrastructure (Submitted by ISO/TC 211) | 7 (b) |
| E/CONF.93/B.P.9<br>B.P. 9 (Abstract) | Land administration, spatial data infrastructure and sustainable development (Submitted by the Secretariat) | 7 (c) |
| E/CONF.93/B.P.10<br>B.P. 10 (Abstract) | Land administration infrastructures for sustainable development (Submitted by the International Federation of Surveyors) | 7 (c) |
| E/CONF.93/B.P.11<br>B.P. 11 (Abstract) | Global mapping and national mapping organizations at the turn of the Millennium: the challenge of a changing world (Submitted by the Secretariat) | 7 (a) |
| E/CONF.93/B.P.12 | Spatial data infrastructure and development: the World Bank approach (Submitted by the World Bank) | 7 (a) |

| *Symbol* | *Title/country* | *Agenda item* |
|---|---|---|
| E/CONF.93/B.P.13 | Geotechnologies for global development (Submitted by the Spanish Society for Cartography, Photogrammetry and Remote Sensing) | 7 (b) |
| E/CONF.93/B.P.14 | Cartographic developments and challenges for dissemination of geospatial data (Submitted by the International Cartographic Association) | 7 (c) |
| E/CONF.93/B.P.15 | Geospatial data dissemination: reality, obstacles and possibilities (Submitted by the International Cartographic Association) | 7 (c) |
| E/CONF.93/B.P.16<br>B.P. 16 (Abstract) | Role of the Permanent Committee on Spatial Data Infrastructure for the Americas | 7 (a) |
| E/CONF.93/B.P.17 | Development needs and institutional capacity-building (Submitted by the Ordnance Survey of the United Kingdom) | 7 (a) |
| E/CONF.93/B.P.18 | Acerca de datos fundamentales (Submitted by Instituto Nacional de Estadistica Geografia e Informatica) | 7 (b) |
| E/CONF.93/B.P.19 | Spatial data infrastructures: a local-to-global view (Submitted by the Federal Geographic Data Committee) | 7 (a) |

# Annex III

## Provisional agenda for the Eighth United Nations Regional Cartographic Conference for the Americas

1. Opening of the Conference.
2. Election of the President and other officers of the Conference.
3. Objectives of the Conference.
4. Organizational matters:
   (a) Consideration and adoption of the rules of procedure;
   (b) Adoption of the agenda;
   (c) Establishment of committees and election of Chairmen;
   (d) Organization of work;
   (e) Credentials of representatives to the Conference.
5. Country reports.
6. Reports on the implementation of resolutions adopted at the Seventh United Nations Regional Cartographic Conference for the Americas.
7. Report of the Permanent Committee on SDI for the Americas (PC-IDEA).
8. Reports on achievements in geographic information in addressing national, regional, and global issues, including:
   (a) Strategy, policy, economic and institutional issues;
   (b) Spatial data infrastructures;
   (c) Geospatial data collection, management and dissemination;
   (d) . Best practices and applications.
9. Adoption of resolutions and the report of the Eighth United Nations Regional Cartographic Conference for the Americas.
10. Review of achievements of the Conference.
11. Provisional agenda for the Ninth United Nations Regional Cartographic Conference for the Americas.

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