

**The Permanent Committee on  
GIS Infrastructure for Asia and the Pacific (PCGIAP)  
And The Asia-Pacific Spatial Data Infrastructure (APSDI)  
- Linking NSDIs to GSDI**

Paper presented by Prof. Yang Kai  
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This paper describes the role of the Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP) and the definition of the Asia and the Pacific Spatial Data Infrastructure (APSDI) that the PCGIAP has developed. And it describes how the APSDI links to the National Spatial Data Infrastructures (NSDI) and to the Global Spatial Data Infrastructure (GSDI) initiative.

*Role of the PCGIAP*

**Background**

At the 13<sup>th</sup> United Nations Regional Cartographic Conference for Asia and the Pacific (UNRCC-AP) held in Beijing, China in May 1994, the following resolution was adopted:

***“16. Permanent regional GIS infrastructure committee***

The Conference,

Noting the rapid development and progress of geographical information systems in all countries in past years,

Bearing in mind that geographical information systems form a fundamental part of the information industry,

Recognizing the urgent need for regional and global geographical information system cooperation and the necessity for experience exchange and technology transfer on geographical information systems,

Recommends that within a year from now, with the initial administrative support of the United Nations Secretariat, directorates of national survey and mapping organizations in the region form a permanent committee to discuss and agree on, inter alia, geographical information system standards, geographical information system infrastructure and institutional development, and linkage of the prospective committee with related bodies in the world.”

Pursuant to Resolution 16 above, the Permanent Committee was formally established at its inaugural formation meeting held in Kuala Lumpur, Malaysia on 12-14 July 1995. The Committee is formally known as the **"Permanent Committee on GIS Infrastructure for Asia and the Pacific"**.

The Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP) operates under, and reports to, the United Nations Regional Cartographic Conference for Asia and the Pacific (UNRCC-AP).

## **Aims**

The aims of the PCGIAP are to maximise the economic, social and environmental benefits of geographic information in accordance with Agenda 21 by providing a forum for nations from Asia and the Pacific to:

- Cooperate in the development of a regional geographic information infrastructure;
- Contribute to the development of the global geographic information infrastructure;
- Share experiences and consult on matters of common interest; and
- Participate in any other form of activity such as education, training, and technology transfer.

## **Objectives**

The objectives of the PCGIAP are to:

- Define the nature of a regional geographic information infrastructure that each country in the region can contribute to in order to meet regional and global mapping and GIS requirements;
- Determine the nature of legislative and administrative procedures and orders appropriate to the acquisition and sharing of spatial data;
- Develop a regional geodetic framework, regional topographic datasets, national cadastral datasets and regional geographical names datasets as the basis for regional GIS activity;
- Document the status of key geographic datasets and key agencies in each member nation, and develop a framework for the exchange of such information;
- Prepare guidelines and strategies to assist member nations for the implementation of cadastral development to meet individual member nation needs;
- Determine the need for research, training and technology and policy exchange in relation to the beneficial impact of geographic information on the social, economic and environmental objectives of member nations of Asia and the Pacific region;
- Explore opportunities for aid funding to support development needs of member nations and for the development of a regional spatial data infrastructure.

## **Membership**

The membership of the PCGIAP consists of the directorates of national survey and mapping organizations or equivalent national agencies of the 55 nations from Asia and

the Pacific as advised by the United Nations. Each nation nominates a single representative to the PCGIAP. Member nations are shown in Table 1.

Table 1: Member nations of the PCGIAP

1. Afghanistan	20. Kazakhstan	37. Northern Marianas
2. Armenia	21. Kiribati	38. Pakistan
3. Australia	22. Korea North	39. Palau
4. Azerbaijan	(Democratic People's	40. Papua New Guinea
5. Bangladesh	Republic)	41. Philippines
6. Bhutan	23. Korea South (Republic)	42. Russian Federation
7. Brunei Darussalam	24. Kyrgyzstan	43. Samoa (American)
8. Burma	25. Laos	44. Samoa
9. Cambodia	26. Macao, China	45. Singapore
10. China	27. Malaysia	46. Solomon Islands
11. Cook Islands	28. Maldives	47. Sri Lanka
12. Fiji	29. Marshall Islands	48. Tajikistan
13. French Polynesia	30. Micronesia	49. Thailand
14. Guam	31. Mongolia	50. Tonga
15. Hong Kong	32. Nauru	51. Turkmenistan
16. India	33. Nepal	52. Tuvalu
17. Indonesia	34. New Caledonia	53. Uzbekistan
18. Iran	35. New Zealand	54. Vanuatu
19. Japan	36. Niue	55. Vietnam

## Meetings

PCGIAP meetings are held in conjunction with the triennial UNRCC-AP meetings and also annually between these meetings. Details of PCGIAP meetings are shown in Table 2.

Table 2: Details of PCGIAP meetings

Meeting	Location	Date
13 <sup>th</sup> UNRCC-AP	Beijing, China	May 1994
1 <sup>st</sup> PCGIAP Meeting	Kuala Lumpur	July 12-14, 1995
2 <sup>nd</sup> PCGIAP Meeting	Sydney, Australia	Sept. 29-Oct. 4, 1996
14 <sup>th</sup> UNRCC-AP/3 <sup>rd</sup> PCGIAP Meeting	Bangkok, Thailand	Feb. 1-7, 1997
4 <sup>th</sup> PCGIAP Meeting	Tehran, Iran	Feb.28-March 4, 1998
5 <sup>th</sup> PCGIAP Meeting	Beijing, China	April 19-22, 1999
15 <sup>th</sup> UNRCC-AP/6 <sup>th</sup> PCGIAP Meeting	Kuala Lumpur, Malaysia	April 11-14, 2000
7 <sup>th</sup> PCGIAP Meeting	Tsukuba, Japan	April 24-27, 2001
8 <sup>th</sup> PCGIAP Meeting	Brunei (to be confirmed)	2002
16 <sup>th</sup> UNRCC-AP/9 <sup>th</sup> PCGIAP Meeting	To be determined	2003

## Executive Board

The PCGIAP is managed through an Executive Board. The functions of the Executive Board are to:

- Plan and coordinate the Committee work program between plenary sessions of the Committee;
- In consultation with the United Nations, plan and manage the activities that the Committee undertakes for the UNRCC-AP;
- Manage the continuing administrative affairs of the Committee;
- Define, monitor and assess the regional spatial data infrastructure;
- Make recommendations on objectives, and on activities and work programs to the Committee;
- Arrange and manage publications including directories, internet sites and promotional material, and to distribute appropriate documents to Members, individuals and organizations concerned;
- Prepare and submit reports on activities of the Committee to the UNRCC-AP;
- Take opportunities to give presentations to related bodies such as ISO/TC211, ISCGM, the GSDI Steering Committee and other bodies at conferences and other relevant events.

The composition of the Executive Board (2000-2003) is shown in Table 3.

Table 3: Executive Board of the PCGIAP (2000-2003)

President	China	Prof. Yang Kai Deputy Director General State Bureau of Surveying and Mapping
Vice President	Australia	Mr. Peter Holland General Manager Australia Land Information Group
Secretary	Japan	Mr. Yoshihisa Hoshino Deputy Director General Geographic Survey Institute
Board Members	Iran	Mr. Saeid Noori Bushehri Head of GIS Department National Cartographic Centre
	Malaysia	Mr. Hamid Ali Director General Department of Survey & Mapping
	India	Lt General Ashok K Ahuja Surveyor General Survey of India
	The Philippines	Engr. Mr. Isidro S Fajardo Administrator National Mapping & Resource Information Agency

	Russia	Mr. Alexander A. Drazhnyuk President Federal Service of Geodesy & Cartography
	Brunei	Pengiran Haji Matusin Matasan Surveyor General Survey Department, Ministry of Development
	Cook Islands	Mr. Keu Mataroa Policy Advisor Ministry of Works

## Working Groups

Working Groups are established, where required, to undertake projects in pursuit of the PCGIAP aims and objectives. The present Working Groups and their operational areas for 2000-2003 are shown below:

- **WG1: Regional Geodesy (Chaired by Australia)**
  1. Establishment of a regional geodetic vertical datum
  2. Enhancement of a regional geodetic infrastructure through annual cooperative campaigns
  3. Regional geoid improvement
  4. Implementation of an absolute gravity reference system
  5. Development of transformation parameters for spatial data
  6. Geodetic technology transfer to Pacific island nations
- **WG2: Fundamental Data (Chaired by Iran)**
  1. Policy for sharing fundamental data
  2. Development of fundamental data
  3. Development of APSDI network
  4. GIS applications
- **WG3: Cadastre (Chaired by Malaysia)**
  1. Discussion and research into the marine cadastre
  2. Study of land administration issues in member countries
  3. Generic template/country profile analyses of cadastre & LIS status in member countries
- **WG4: Institutional Strengthening (Chaired by Philippines)**
  1. Capacity building, education and training in the fields of geodesy, surveying, mapping and creation of fundamental datasets and GIS programs
  2. Identify needs and seek funding options for member countries' GIS and related development projects and to improve participation of member countries in PCGIAP activities

## **Links with Other Organizations**

In addition to reporting to the UNRCC the Permanent Committee seeks to establish links with other relevant United Nations programs and international agencies such as the:

- United Nations Economic and Social Commission for Asia and the Pacific Regional Space Applications Program for Sustainable Development;
- International Association of Geodesy (IAG);
- International Federation of Surveyors (FIG);
- International Steering Committee for Global Mapping (ISCGM);
- International Steering Committee for Global Spatial Data Infrastructure (GSDI)
- United Nations Regional Cartographic Conference for the Americas(UNRCC-Am);
- European Umbrella Organization for Geographic Information (EUROGI);
- International Standards Organization technical committee on international GIS standards (ISO /TC211)

## **Major Achievements**

- “PCGIAP Publication No.1: A Spatial Data Infrastructure for the Asia and the Pacific Region” sets out the vision of the PCGIAP for a regional spatial data infrastructure that comprises fundamental data, standards, institutional arrangements and access mechanisms.
- Regional geodetic observation campaigns to develop a regional geodetic framework using VLBI, DORIS, SLR and GPS
- Draft Policy on Sharing Fundamental Data & Draft Guidelines on Custodianship
- Surveys and analysis on SDI development needs and fundamental datasets
- Pilot project on administrative boundary data
- Development of a prototype APSDI Data Node network
- Liaison relations with GSDI, GM, ISO/TC211, Digital Earth, UNRCC-Am, and etc.
- A comprehensive website through which PCGIAP receives considerable promotion - <http://www.pcgiap.org>

## ***The Asia and the Pacific Spatial Data Infrastructure (APSDI)***

### **What is APSDI?**

The Asia and the Pacific Spatial Data Infrastructure (APSDI) comprises an institutional framework, technical standards, fundamental datasets and a distribution network. Through these mechanisms it provides a network of databases, located throughout the region, that together provide the fundamental data needed to achieve the region's economic, social, human resources development and environmental objectives.

Those distributed databases might include such themes as geodetic, cadastral, topographic, geographical names, hydrographic and economic data. They may, in the future, be linked electronically so that they appear, to the user, as a virtual database, but they are linked together in a number of other important ways:

- by an intra-regional institutional framework that provides mechanisms for sharing experience, technology transfer and coordination of the development of the

fundamental datasets;

- by the use of common technical standards, including a common geodetic reference frame, so that data from numerous databases can be brought together to create new products and solve new problems, both regionally and globally;
- by the adoption of common policies on data access, pricing, privacy, confidentiality, distribution and custodianship;
- by the implementation of intergovernmental agreements on data sharing; and
- through a comprehensive and freely accessible directory of available datasets containing descriptions and administrative information that accords with agreed standards for metadata.

It is this suite of administrative and technical linkages that distinguishes the Asia and the Pacific Spatial Data Infrastructure from a collection of uncoordinated datasets, and which makes the RSDI such a powerful tool for the region's economic and social development.

It is important to understand that the database of the APSDI is:

- NOT a centralized database controlled by some central authority! It is a distributed database under the control of numerous custodians of individual datasets who retain their control over the data, but which are linked by a common set of standards and protocols.
- NOT a comprehensive GIS of all things! It just contains the basic, essential data on which and from which other datasets will be built. Over time, however, it is anticipated that the RSDI will grow to become a virtual GIS as other custodians recognize the benefits of offering their data in a form that conforms to the RSDI model and standards.

### **Why is APSDI needed?**

A significant proportion of the region's economic development and social and environmental well being is heavily dependent upon the use of land and water resources. For example, mining, farming, forestry, transport, tourism, coastal zone management and the planning of services for the community, to name a few.

Many of the things that nations of the region want to achieve can only be realized if good, consistent spatial data are available and readily accessible. This is especially important when planning for the future.

Spatial data describes information that can be related to a position on the Earth's surface whether that is on the land, sea or in the air. Information about vegetation, minerals, road networks, property ownership, soils, air quality and population distribution can all be spatially related. Regional issues such as land development and transport planning all require good, consistent spatial information. There are few areas of cooperation between nations that do not rely either directly or indirectly on this kind of information.

The PCGIAP believes that the nations of the region should reach agreement on what fundamental datasets are required to meet their common interests, to what standard they

should be collected and maintained, which agencies should have custodianship of those data, and what the priorities are for their collection.

The PCGIAP believes that the region can benefit from better management of its spatial information by taking a perspective that starts from the national level and works up to the regional level.

If all nations adopt a regional perspective they will not only avoid wasting resources but will be able to provide users with consistent, reliable data that can be used to address sustainable development issues.

It is important that the information needed to support regional activities be identified and where it exists, for it to be made widely available. Gaps in the availability of data should be identified and priorities for filling those gaps determined. A spatial data infrastructure addresses these issues.

The establishment of an APSDI with its associated fundamental datasets, standards and data management guidelines will assist in maximizing the return on the region's investment in this vital resource of spatial data.

### *From NSDI to APSDI*

Government throughout the world are coming to recognize that information is one of the most critical elements underpinning decision making for economic, environmental and social development, and there is a need to assign resources to establishing an effective information infrastructure.

For example, in April 1994 the President of the United States of America issued an Executive Order that implemented a National Spatial Data Infrastructure. The European Community has developed detailed policies and strategies for a European Geographic Information Infrastructure. Similar steps are being taken at a national level in Australia, China, Malaysia, Japan, Iran and other countries in our region.

The APSDI will be built in a similar way to the approach being taken to build a national SDI in many countries. Many countries are linking the SDI at local level into a broader national SDI. The APSDI is envisaged to be a network of linked national SDI. The principal benefit of this approach is that member nations manage and control their individual component of the APSDI and can therefore ensure that it is designed to meet their national needs and objectives, as well as contributing to broader regional objectives. This is achieved without compromising the independence and sovereignty of individual nations. National governments retain responsibility for custodianship of their data and control access to that data. This bottom-up approach is likely to encourage member nation participation in the APSDI.

A potential weakness in the approach is the gaps that may arise in the APSDI due to different stages of SDI development in member nations. Some nations in the region are well advanced in their efforts to implement a spatial data infrastructure while others are just beginning to take steps in this direction. These gaps need to be filled, at least in the short term, by co-operation and support between member nations in the region.

The PCGIAP is playing an important role in helping countries develop national spatial data infrastructures and to incorporate them into the APSDI. In time the national spatial data infrastructures can be combined through the regional model into the global spatial data infrastructure. In this way the PCGIAP's activities demonstrate the "think globally, but act locally" approach, a major principle of Agenda 21.

### *From APSDI to GSDI*

The PCGIAP believes that the bottom-up approach for APSDI is equally applicable to the implementation of the GSDI. The GSDI can be viewed as a network of inter-linked regional SDI, such as the APSDI. Where such regional SDI does not exist, consideration should be given to establishing appropriate arrangements for their creation. The organization model of the PCGIAP may well apply in other regions.

Given that large areas of the globe are unlikely to be covered by regional SDI, either in the short or long term, and given the need for global coverage of fundamental datasets in order to address global issues such as sustainable development, complementary global programs are also required. A combination of bottom-up and top-down approaches is required for implementation of the GSDI.

For a GSDI to be effectively implemented it must encompass a vision that is clearly understood and widely supported. It must address needs at the local, regional, as well as the global level. The key to its success lies in a broad based organization framework that facilitates participation, cooperation, sharing and a willingness to pursue common approaches.

Many such organizational frameworks already exist at the national and regional level. The PCGIAP provides an example of a regional forum that aspires to build not only a spatial data infrastructure for Asia and the Pacific, but to also support developments in member nations. The GSDI must build on these existing arrangements, therefore implying a need for both a bottom-up and top-down approach to implementation.

The nations of Asia and the Pacific strongly support moves for the implementation of spatial data infrastructures at all levels of government, and the linking of those initiatives, to provide the world with a comprehensive resource of quality spatial data for improved decision-making in economic and social development.

## *Conclusion*

The development of the APSDI is an undertaking of immense proportions but the PCGIAP believes that the potential benefits to the region are so great that it must be addressed. The resolve, good will and cooperation exhibited by the members of the PCGIAP will ensure that their vision will be realized.

Over time, the detailed implementation plans for the APSDI will develop, evolve and mature. They will adjust to the continually changing technological environment. Technical and administrative hurdles will be overcome.

Investment in spatial data collection, management and development will increase as the importance of this resource is recognized. A vigorous spatial data industry will emerge, servicing the needs of governments, industry and the community.

The knowledge shared, the experience gained, the synergy generated and the benefits flowing from this cooperative initiative will yield an outcome that is far greater than nations of the Asia and the Pacific region could have achieved acting alone.

## **References**

1. Permanent Committee on GIS Infrastructure for Asia and the Pacific, Internet home page, <http://www.pcgiap.org>
2. PCGIAP Publication No. 1: A Spatial Data Infrastructure for the Asia and the Pacific Region