



CHARLES STURT
UNIVERSITY



Spatial Data Analysis Network (SPAN)

N e w s l e t t e r

February, 1999.

Mission Statement: "To achieve excellence in the application of innovative spatial analysis in support of research, education and community outreach."

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SPAN Web site NOW Online!

The development of SPAN's new web site has been under way for several months. *We are pleased to say that SPAN's web site is now online!*

See the new SPAN web site at...

<http://www.csu.edu.au/division/dit/span>

Why not add it to your bookmarks?

Some of the features of our new web site include...

- Details of our increasingly popular GIS workshops;
- Easy to understand definitions of Geographic Information Systems (GIS), Remote Sensing and Spatial Statistics;
- Access to information about the services which SPAN provides. Information is available detailing how staff and postgraduate students can access SPAN's *software support* and *printing* services;
- Up-to-date detail on SPAN's interesting GIS and Remote Sensing projects and applications;
- A data catalogue. SPAN is currently undertaking an inventory of spatial datasets within the University. This is an ongoing task, but as soon as information becomes available, it will be posted on the web page. This will become the first port of call for anyone looking for spatial data;



GIS - Current and Upcoming Events!

February 12th. – **NEWTECH for today** – *Rural Technology Conference, CSU, Albury.*

Particular focus on GIS and Remote Sensing. For more information, and to register, see ...

<http://www.ballarat.edu.au/crr/ConferenceCircuit/ccalbi1.html>

Coming up very soon...so be quick!

October 19th-22nd – **SPATIAL METADATA AND ONLINE GIS**– *Workshop and Conference, CSU, Bathurst.*

Focussing on spatial metadata; online GIS; spatial data warehousing; computer and communication technologies to support global GIS; and management issues in spatial data and metadata standards. For more information, and to register, visit ...

<http://clio.mit.csu.edu.au/admin/metadata.html>

or contact *Leanne Jones, School of Information Technology, CSU, Bathurst.*

Ph: (+612) 6338 4724 Fax: (+612) 6338 4649 Email: lejones@csu.edu.au

SPAN Makes the Move to ESRI GIS Software



SPAN has switched its top end GIS software from *GenaMap* to *ARC/INFO*. Produced by Environmental Systems Research Institute (ESRI) of Redlands, California, *ARC/INFO* is one of the world's leading GIS software packages. Used for research and development by over 100,000 users worldwide, *ARC/INFO* facilitates sophisticated, high-end geoprocessing operations. *ARC/INFO* integrates tabular DBMS data with the following data types: vector, raster, photographs, scanned documents, satellite images, CAD drawings, and sound/video. To complement *ARC/INFO* SPAN has also purchased *ArcView* GIS software (*ARC/INFO*'s younger sibling) to facilitate easy data querying and map creation. With *ARC/INFO* you can...

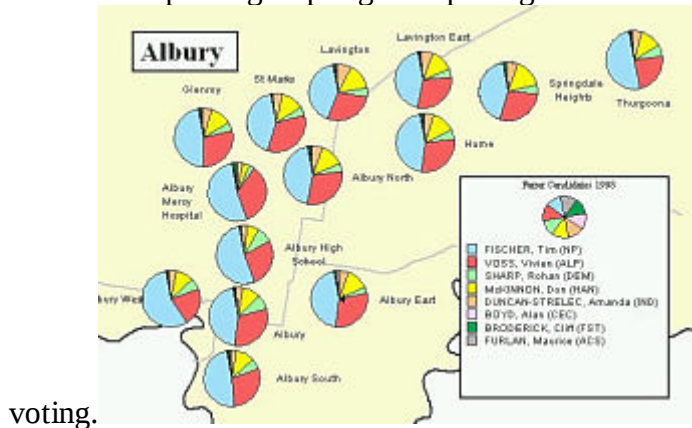
- create and maintain geographic information;
- Manage large, multi-user spatial databases;
- Integrate multiple data types;
- Perform sophisticated spatial analysis;
- Produce high-quality maps for publication;



SPAN has initially purchased 10 *ARC/INFO* and 10 *ArcView* licenses, which will be available to users across the University. The addition of *ARC/INFO* to SPAN's suite of software products hails exciting times ahead, for both existing and potential GIS users within the University. New workshops will be offered to train staff in the use of this software.

The Geography of Tim Fischer's Vote – SPAN Project Update.

SPAN is currently undertaking a research project to examine the spatial nature of voter behaviour within the Federal Division of Farrer; the seat currently held by the Deputy PM, Tim Fischer (National Party), in association with *Associate Professor Jim Forrest* (Geography Dept., Macquarie University) and *Associate Professor Margaret Alston* (Centre for Rural Social Research, CSU Wagga). Tim Fischer's seat resides in Southern NSW, running along the Murray River from Khancoban in the East to the South Australian border in the West (see right). Election results from the 1996 and 1998 elections have been analysed using an entropy process which attempts to group together polling booths which displayed similar patterns of



voting.

Some interesting patterns have already emerged. Whilst Tim Fischer managed to retain his seat, a swing of 13% was recorded against the Nationals. Most of this swing went to the One Nation party, but it was not a uniform swing. Our results show that support for One Nation was particularly strong in the West of the electorate. Also of interest was the above average support for the ALP in the major towns of Albury and Deniliquin, and along the River Murray. With further research, we hope to reveal some of the factors contributing to the spatial variation in voter behaviour.

Left: 1998 Federal Election - Voting Patterns in Albury

Software Training - Introductory GIS Workshops

SPAN finished 1998 by running a number of training workshops including *Introductory GIS* and *S-PLUS* workshops in both Bathurst and Albury. SPAN will continue to offer a series of GIS training workshops in Albury, Bathurst and Wagga throughout 1999.



SPAN's GIS training workshops are designed to provide hands-on training in a variety of GIS software packages (see above). Our major aim is to train workshop participants to a level where they can comfortably perform simple GIS tasks such as data querying and mapping. Additionally, we are keen for participants to form an appreciation of the potential uses of GIS in their particular area of endeavour.

SPAN can (if requested) customise existing courses or develop new ones to meet the specific needs of users. SPAN has up until now made extensive use of *GenaMap* (Genasys) software in its training courses, but with our move to ESRI software (ARC/INFO & ArcView), this focus is likely to change. Training courses are also run using MapInfo software (PC based desktop GIS). Ongoing technical support and further training is available to participants of our training courses.

Introductory GIS Workshop Dates for 1999...

	<i>Location</i>		
	<i>Albury</i>	<i>Bathurst</i>	<i>Wagga Wagga</i>
<i>1999 Dates</i> *	Friday 5 th March	Friday 5 th March	Friday 30 th April
	Friday 7 th May	Friday 2 nd July	Friday 11 th June
	Friday 2 nd July	Friday 17 th September	Friday 13 th August
	Tuesday 30 th November	Tuesday 30 th November	Friday 1 st October

* Workshop dates may be subject to change.

Check with your local SPAN representative for the latest information.

S-Plus Spatial Statistics Workshop Dates for 1999...

At each campus, an S-Plus workshop will be run one day prior to the Introductory GIS Workshops.

You can register for a workshop by visiting the SPAN web site at ... [workshops](#)

Or by [contacting](#) your local SPAN representative.

SPAN Upgrades Printing Capabilities.



SPAN has recently acquired a large format Hewlett-Packard Designjet 2500CP Printer. Capable of producing *photo-realistic images*, this printer is ideal for producing high quality conference posters, maps and image presentations. This printer is capable of printing a variety of file formats, including Adobe™ Postscript™ and can print up to A0 size sheets (84cm x 118cm). This printer becomes the obvious choice for creating high quality, eye-catching output. If you are interested in making use of this facility, contact SPAN in Wagga on 32 165.

Recent Data Acquisitions.

SPAN has recently received funding from an Research Management Committee Block Grant to purchase a number of datasets which should prove very useful to CSU researchers. These datasets are valuable additions to SPAN's collection, which **already includes ABS census data**

To view
sample data
*click this
box*

from the 1991 and 1996 census' of the Australian population.

Reduced Output Spatial Data

SPAN has purchased *Reduced Output Spatial Data* for three Australian mainland states - New South Wales, Victoria and the ACT. This is a map dataset (see example to right) which can be used to display towns, roads (3 levels of detail), rivers (2 levels), lakes, features (such as hospitals, parks, schools etc.), and national park locations...amongst others. This data should facilitate the production of high quality maps for inclusion in reports and published articles.

for more information on ROSD see...

<http://www.datamall.com.au/Catalog/product.asp?pid=1550>

Integrated Regional Database '98

SPAN has also purchased the latest *Integrated Regional Database (IRDB98)* from **the Australian Bureau of Statistics**. This dataset covers the whole of Australia, and provides users with the ability to access and analyse regionalised economic and social data from a wide range of ABS and non-ABS collections.

IRDB98 can be used for a whole range of applications including...

- developing regional ***business profiles*** (including ***tourism & retail*** sectors);
- identifying trends in regional ***agricultural production***;
- ***employment*** patterns analysis;
- providing information for broad or specific regional ***demographic analysis***;
- providing information for ***socio-economic analysis*** (eg. a region's income distribution);

see <http://www.statistics.gov.au> for more information on IRDB98.

Where to find the Spatial Data Analysis Network (SPAN)...

Based in Wagga, SPAN also has staff in Albury and Bathurst.

Correspondence to... **PO Box 588, Wagga Wagga, NSW 2678.**

Albury Chris Medlin

Rm 235, New Building,
Thurgoona Campus.

Ph: (02) 6051 9922

Fax: (02) 6931 6919

E-mail: cmedlin@csu.edu.au

Bathurst Jannine Niven

Room 215, Building S1
Bathurst.

Ph: (02) 6338 4676

Fax: (02) 6338 4298

E-mail: jniven@csu.edu.au

Wagga Wagga Craig Poynter

Ground Floor, Building 10,
Wagga Wagga.

Ph: (02) 6933 2165

Fax: (02) 6933 2735

E-mail: cpoynter@csu.edu.au

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Spatial Data Analysis Network (SPAN)

NEWSLETTER



OCTOBER 1999

Mission Statement: *"To achieve excellence in the application of innovative spatial analysis in support of research, education and community outreach."*

Land Information Centre (LIC) Proposal for the Landsat 7 imagery

LIC is currently organising a group of stakeholders, including government agencies, research institutions and universities within NSW, to be involved in the annual acquisition of 'Baseline' Landsat



imagery. LIC will orthorectify (ie. remove distortions and apply real world coordinates) all data to standard specifications, to produce a complete coverage of NSW. There will be 'no royalty' payments and no copyright on this data. Briefly, the proposal provides stakeholders with the following benefits:

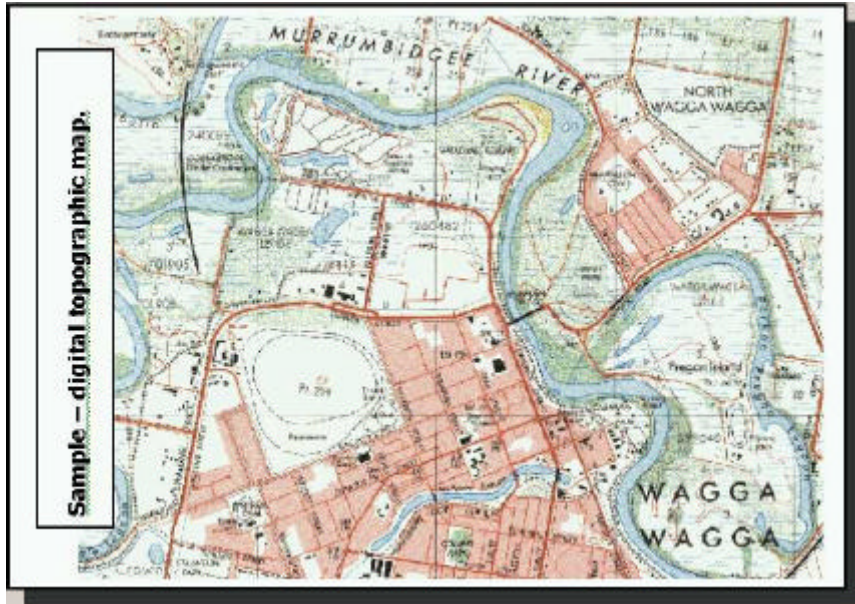
*Access to LANDSAT 7 imagery (level 5) for the **whole of NSW** (updated annually). **56 scenes** (180 km x 180 km) with 8 spectral bands at 25 metre resolution! Access to resampled imagery (Level 10 orthorectified images) will also be provided but LIC retains the intellectual property. **Research and teaching applications are exempted from royalty payments.***

This initiative would provide spatial data users with access to a state-wide satellite image mosaic. It is anticipated that data capture will begin in April 2000, with the data processed and distributed to users before the end of the year. A meeting will be convened in February 2000 to formalise the agreement

SPAN has expressed interest in being one of the stakeholders in this project.

New Raster Data Acquisition – Digital Topographic Maps...

SPAN and the Farrer Centre have jointly purchased scanned images of the **topographic maps of the NSW**. This data can be used as a backdrop to the airborne video system capture and will help the pilot navigate during flight sessions.



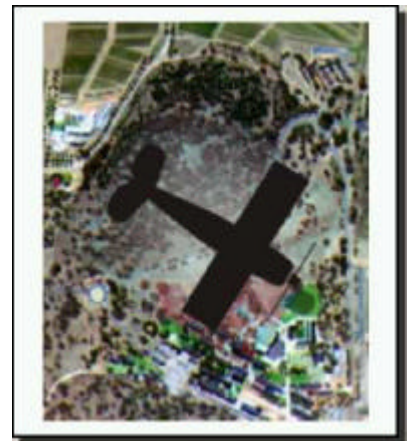
The data consists of scanned images (175dpi) of the topographic maps. There are a total of **1100 images** covering NSW, comprising of a range of medium to small scale topo maps (750 maps @ 1:25000, 230 maps @ 1:50000, 120 maps @ 1:100000). This data will provide state-wide coverage of NSW and can be used as a backdrop for various GIS and Remote Sensing research applications.

Copyright on the data requires that consultancy projects pay a 10% royalty, whilst teaching and research applications are exempt.

CSU's New Airborne Video System – Approaching Completion

After several years of design, development and construction Charles Sturt University's **new multispectral airborne digital imaging system (MADIS)** is finally approaching completion. A Wagga Air Centre Cessna 310 now has a hole cut in its floor to accommodate the MADIS. After a rebuild of the camera mount, the MADIS now has a clear field of view out of the aircraft. The MADIS has been in the aircraft, run off aircraft power and has been confirmed to not interfere with aircraft instruments. A final modification is being made to mount the data acquisition system above the cameras in the aircraft. This one piece architecture will facilitate rapid installation and removal of the MADIS.

This new system has several advantages over the old system. At **1m spatial resolution** the new system covers 1008m x 1008m with a 10 bit data depth compared to the old system's coverage of 740m x 576m at 8 bit data depth. The new cameras used are **progressive scan cameras** which eliminates the annoying "shear" distortion(odd and even rows of the image offset by 0 - 4 pixels) inherent in the old system due to it's interlaced cameras. A combination of variable electronic shutter speed and fixed camera apertures instead of fixed shutter speed and belt driven apertures is expected to greatly improve the radiometric calibration of the system. In addition, sourcing power from the aircraft instead of from batteries greatly reduces the weight and increases the running time of the new system. **Staff interested in MADIS imagery should contact SPAN, Wagga.**



Move to ERDAS IMAGINE software proposed for Remote Sensing.

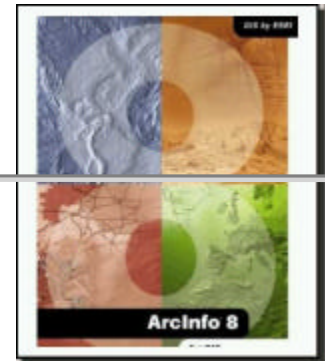


SPAN is proposing to change its **remote sensing software**. SPAN recently learnt that future development of ERMapper will be tailored towards PC market. This means that there will be no future upgrades for the UNIX version of the software. Therefore, SPAN proposes a move to **ERDAS IMAGINE** to accommodate UNIX-based research applications. A15 seat licence is being considered. SPAN plans to conduct training workshops next year to introduce new users to this software.

Latest Developments in GIS software.

CSU has renegotiated the existing GIS software license agreement with ESRI, subsequently purchasing an ESRI **Site License**. The **Faculty of Science and Agriculture** and the **Division of Information Technology** are financing the \$20K annual fee. This development means that ArcInfo/ArcView will be the primary software platform for GIS research and teaching within the University. GIS users will now enjoy unlimited and multi-platform access to both ArcInfo and ArcView.

Please note - the long tradition of UNIX enjoying better software functionality than the PC/NT counterpart is over. The new release of ArcInfo 8 has new GUI features for NT only.



Referendum 1999 – Preliminary Analysis and Observations

In the week or so after the republic referendum on November 6th, SPAN was able to undertake some **preliminary investigations** into the **referendum voting patterns** exhibited by Australian voters.



These preliminary results make for some very interesting viewing.

At first glance it would appear that the whole of Australia voted against the proposed changes. Of **12,387,729 enrolled voters, 45.13% voted YES whilst 54.87% voted NO**. And whilst in every state (with the exception of the ACT) the overall result was a NO vote, there are some interesting patterns within the states.

These patterns seem to indicate that the **YES vote was predominantly an urban vote**, as there were only 2 electorates outside of the major cities where an overall YES

vote was recorded. The cities of Melbourne and Sydney saw the highest levels of support for the YES vote, particularly in the central and eastern parts of both cities, whilst the division of **Maranoa in outback Queensland** recorded the **highest NO vote (78%)**. Interestingly, further investigation seems to show that the electorates which recorded a YES vote were fairly evenly divided amongst those held by sitting Labor and Liberal members. The indication here is that the YES/NO vote was divided strongly along City/Country lines. Another interesting observation was the degree to which the NO vote seemed to strengthen, according to an electorate's distance from the major cities, with electorates in outback Queensland and NSW recording NO votes of around 70%. The degree to which the results varied according to location is certainly very interesting and would not doubt benefit from further investigation.

For a complete Australia-wide map of the referendum results, please contact SPAN.

GIS Database Management

The following projects are currently at various stages of development....

Riverina Eastern Regional Organisation of Councils (REROC)

SPAN will assist this group to extend the use of GIS technology to the rural communities. SPAN is developing a program to train council based GIS users and provide on-going database support and management. The group is interested in the asset management applications of GIS technology. Preparation of project costing is under way. The project will require a research assistant full-time for 5 months and part-time for the duration of the year; computer leasing etc...

Regional Rural NSW GIS database

SPAN and The Centre for Rural Social Research are costing the feasibility of organising this data for the Premiers Department of NSW. The plan is to centralise and standardise the data in SPAN. The data focuses on social services for the regional NSW. Preparation of project costing is under way.

Please note that the above databases are accessible for teaching and research applications within CSU.

Farrer Centre GIS Database

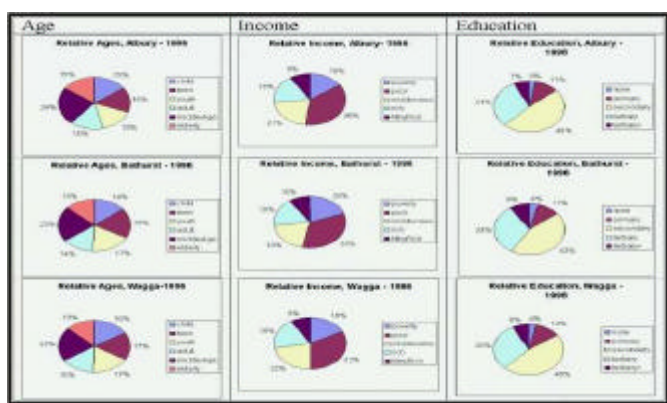
Discussions are under-way to cost managing the Farrer Centre Remote Sensing and GIS databases within SPAN.

How to Analyse your Census Data with MS EXCEL.

Along with the **FREE census data** available for CSU researchers, SPAN has produced some instructional materials showing how sample analyses that can be done in **Microsoft EXCEL**. These example analyses can be viewed by downloading the following document from SPAN's website at

http://www.csu.edu.au/division/dit/span/worksheets/online_courses/WorkingWithCensus.doc

Census data can be obtained on the network once you have a "spanw" and "Oracle" account (available through SPAN). In this MS Word document, you are taken on a step by step journey from the point of obtaining the data, to producing meaningful analysis. The manual starts by explaining how to extract your data from Oracle (which is on the spanw server), through to producing summary pie graphs of age, education and income for the local government areas of Albury, Bathurst and Wagga. It also suggests some ideas for further analyses. For further information on this and other online training courses visit...



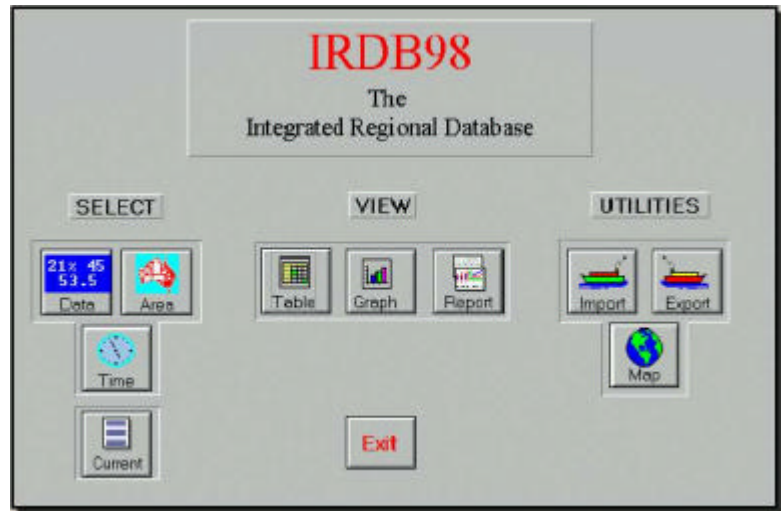
http://www.csu.edu.au/division/dit/span/workshops/online_courses/splus_online.htm

Training – Census and IRDB Databases.

SPAN recently conducted an information and training session for Dr M. Alston and four Postgraduate students from the School of Humanities and Social Sciences. During the two hour session, participants were introduced to background information on **census data** and were provided with hands-on training in accessing census data. Data was accessed from SPAN's Oracle database and from the **Integrated Regional Database**

(IRDB98), an Australian Bureau of

Statistics product. Census data stored within SPAN's Oracle database for the 1991 and 1996 census' can be accessed from all campuses, while data contained within the IRDB, can be accessed by contacting SPAN.



Further information about census data that SPAN has acquired can be found on our website at www.csu.edu.au/division/dit/span by following the **Spatial Data** link.

Network Analysis

Work continues on the Network Analysis component of research undertaken into the voting patterns observed during the 1998 Federal election in the seat of Farrer. A method was sought to try and assign census districts (or more correctly parts thereof) to particular polling stations in an effort to establish a "social profile" of potential electors. Based on the road network, Network Analysis was used to establish catchment areas for polling stations. Census data was allocated to the polling station at the centre of each catchment area according to the proportion each census district overlapping each catchment. Work has since been undertaken to review the methodology in an effort to validate it. Whilst this is work in progress, it is hoped that continued fine tuning of the model used will allow effective allocation of census data to point locations.

SPAN Promotional Poster

SPAN is currently distributing this poster to schools/centres within the University. The poster outlines the services and facilities that SPAN offers. If you are interested in obtaining a copy of this poster, please email cpoynter@csu.edu.au

Spatial Data Analysis Network

Charles Sturt University

What is SPAN?

The Spatial Data Analysis Network (SPAN) is a research support unit within the Division of Information Technology. SPAN's role is to provide access, training and support for CSU researchers in the areas of Geographic Information Systems (GIS), Remote Sensing (RS) and Spatial Statistics.

SPAN aims to ...

- Facilitate research into human and physical problems associated with the Murray-Darling Basin;
- Provide a University-wide set of computer-based tools and training to help researchers address such problems;
- Develop and promote a University-wide user base of GIS and Remote Sensing applications.

What is a Geographic Information System?

GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations.

Why is GIS important?

- A GIS stores information about the world as a collection of **thematic layers** that can be linked together by geography. This single but extremely powerful and valuable concept has proven invaluable for solving many real-world problems: from tracking delivery vehicles, to recording details of planning applications, to modelling global atmospheric circulation.
- Visualisation:** Geographic Information Systems will reveal and show you to explore **spatial patterns** in your data patterns which you might never otherwise have been aware of!
- Geographic Information Systems facilitate **manipulation** of geographic data to produce **new information** via the analytical and manipulative capabilities of computer programs.
- Geographic Information Systems can **turn your data into information!**



What is Remote Sensing?

Remote sensing obtains information about an object without being in contact with it. Remote sensing deals with the detection and measurement of phenomena with devices sensitive to electromagnetic energy such as:

- Light (cameras and scanners)
- Heat (thermal scanners)
- Radio Waves (radar)

How is remote sensing useful?

- It provides a **unique perspective** from which to observe large regions;
- Sensors can measure energy at wavelengths which are **beyond the range of human vision** (ultra-violet, infrared, microwave);
- Global monitoring is possible at nearly any date on earth.



Data!

Free Access to...

Remote Sensing Data

- Satellite Imagery
- Airborne Video Imagery
- Aerial Photographs

Spatial Data

- Cadastral
- Vegetation
- Contour
- Drainage
- Geological
- Land Capability
- Soil
- Transport

Statistical Data

- Population Database
- ABS Census statistics 1991 and 1996 (Australia)
- ABS Census Time Series (1986-1996)
- ABS Confidentialised Unit Record Files (57 tables)
- Integrated Regional Database 1998



Software!

Free Access to...

- ArcView GIS
- ARC/INFO

Training! (Free!)

SPAN offers GIS, Remote Sensing and S-Plus workshops...

- Introductory GIS
- Advanced GIS
- Introductory S-Plus (Statistics)
- Introductory Remote Sensing

Where to find us ...

Based in Wagga, SPAN also has staff in Albury and Bathurst.

Correspondence to: PO Box 588, Wagga Wagga, NSW 2678.

Albury Chris Mueller PO Box 588 Albury 2670, New South Wales Ph: (08) 5651 9022 Fax: (08) 5651 9016 E-mail: cmueller@csu.edu.au	Bathurst Garth Vagg PO Box 588 Bathurst 2770, New South Wales Ph: (08) 5651 9022 Fax: (08) 5651 9016 E-mail: gvagg@csu.edu.au	Wagga Wagga Crisp Poynter PO Box 588 Wagga Wagga 2678, New South Wales Ph: (08) 5442 2165 Fax: (08) 5442 2725 E-mail: cpoynter@csu.edu.au
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Spatial Data Analysis Network

www.csu.edu.au/division/dit/span

ABS CURFS data

In 1999, CSU made 7 applications for the following tables:

SPAN applications

Time Use Survey 1997 Time Use Survey 1992 Child Care Survey March 1996 Australians' employment and unemployment patterns 1994-1997 Mental Health and Wellbeing of Adults, Australia 1997

Alcohol and Tobacco Consumption Pattern, 1997*

***Please note, this table was wrongly dated and contains information for 1977. Subsequently, SPAN will not be sourcing this table.**

School of Biomedical Sciences' application

National Health Survey 1995

CSU users of the above data are as follows:

SPAN School of Biomedical Sciences School of Environmental and Information Sciences Publications The Gilmore Centre Human Movement Studies Unit

School of Social Sciences and Liberal Studies

Please note that these datasets are only accessible to CSU staff and researchers that have submitted application forms.

Costs to CSU:

Annual cost for all universities in 1999/2000 is \$172,000.

In 1999, there are 21 participating universities and the fee is approximately \$8,200.

In 2000, there are 29 participating universities and the fee is adjusted to \$4,000 for the current participants.

GIS researchers – CSU staff profiles...



Xihua Yang - GIS lecturer, School of Information Technology, Bathurst.

Completed his PhD thesis at UNSW, Sydney. He has a BSc. And M.Sc. from Chinese Agricultural University.

His research interests include GIS applications in water resources with a focus on water quality modelling; remote sensing applications in agriculture with focus on soil moisture and evapotranspiration estimation; and multimedia GIS and GIS application system development.

Ph: (02) 633 84780

Email contact: xyang@csu.edu.au

Maria H Tang – Associate Lecturer, School of Environment and Information Science, Albury.

Maria is new to CSU having recently completed her PhD thesis at Melbourne University. She has a

BaEng in Geology, MsAppSci in GIS and GradCert Edu (IT).

Her research interests include: GIS visualization, system integration and multimedia. Her PhD research focussed on the development of an integrated interactive visualization system for forest planning and management. Maria has plans to continue research in this area.

Ph: (02) 605 19617

Email contact: htang@csu.edu.au

Jerry Ratcliffe - Lecturer in Policing (Intelligence), School of Policing Studies, NSW Police Academy, Goulburn.

Jerry is also new to CSU. Jerry holds a BSc from the University of Nottingham, completing his PhD at Nottingham in May 1999. From 1984 to 1993 Jerry worked at various locations in London as a Metropolitan Police Officer. Jerry's current research interests include GIS techniques for crime analysis; implementation of crime mapping systems; LISA spatial statistics; spatial and temporal GIS techniques; visualisation of point pattern data and geocoding accuracy.

Ph: (02) 48232634

Email contact: jratcliffe@csu.edu.au

